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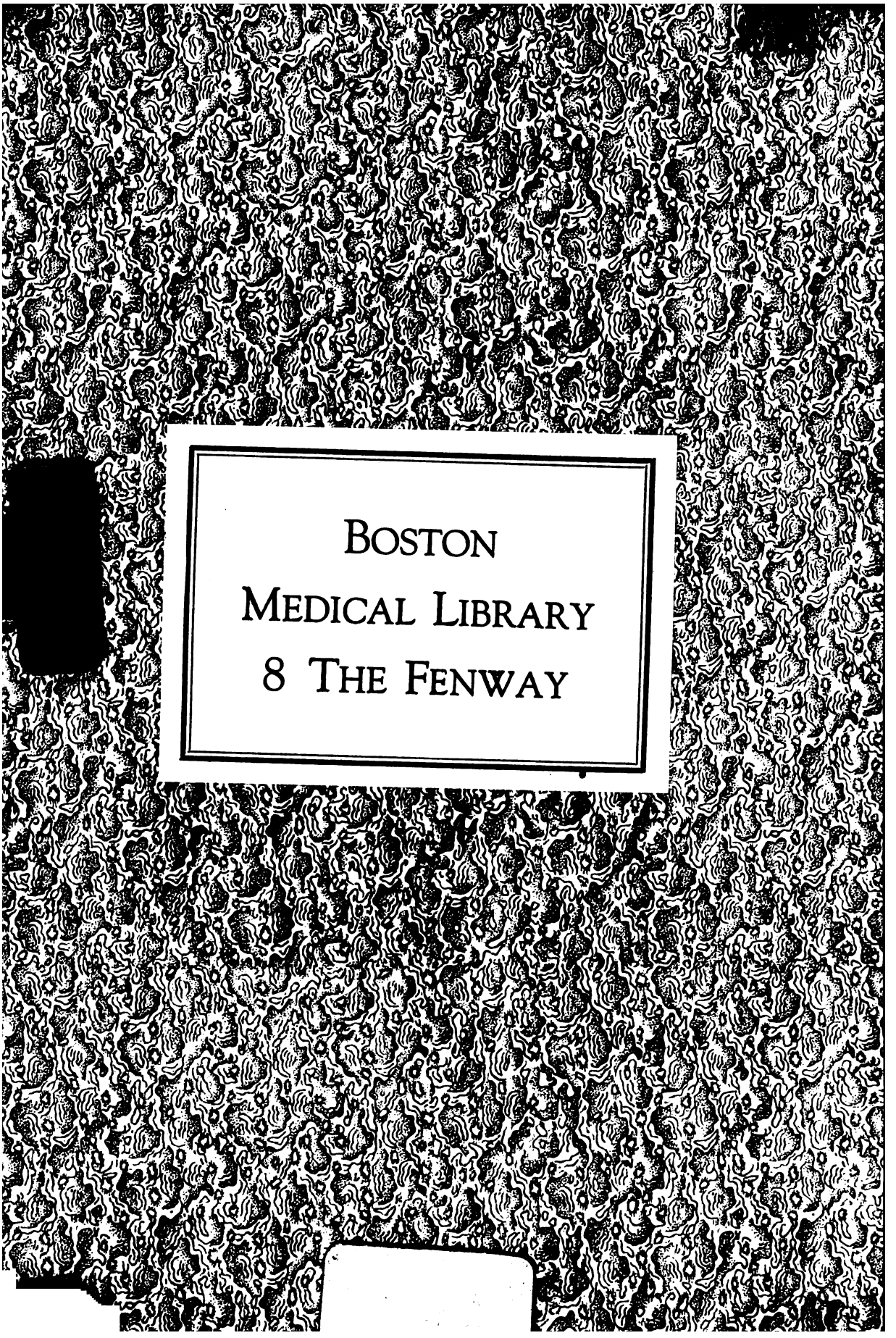
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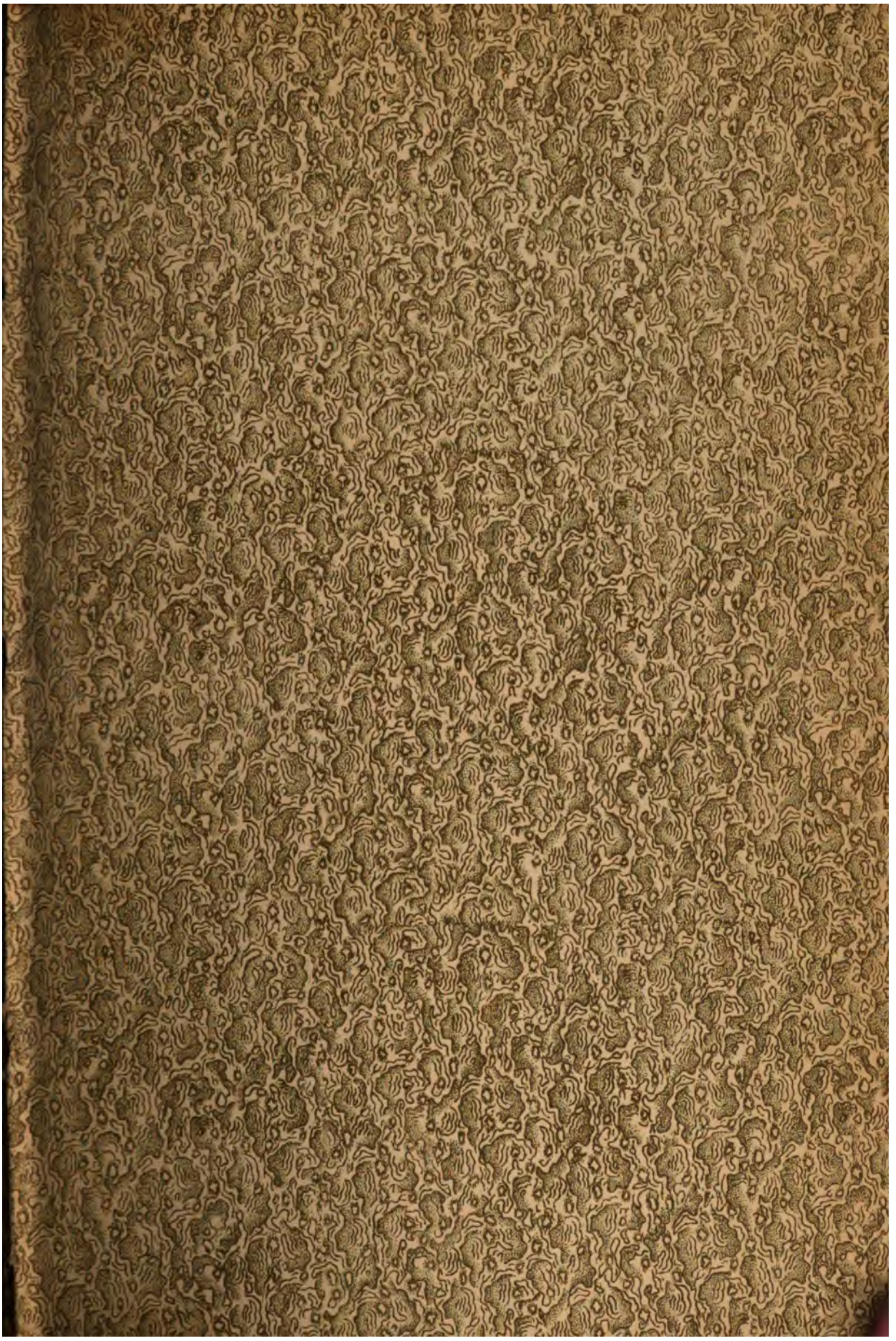

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Original Communications.

*NEW THERAPEUTIC AGENCIES.**

LECTURE IX.—THE NEW MODES OF TREATING TYPHOID FEVER.†

BY PROFESSOR DUJARDIN-BEAUMETZ,‡ PARIS, FRANCE.

GENTLEMEN:—In the last lecture I spoke of the new modes of treating tuberculosis. I shall to-day take for my subject a disease which, next to pulmonary phthisis, is perhaps most frequently observed in ordinary practice: I allude to typhoid fever. In the treatment of this disease considerable progress has been made of late years, as I shall endeavor to show you.

I shall call your attention particularly to the antiseptic treatment of typhoid fever and to the employment of cold baths; and, lastly, to the prophylactic means available, in order to diminish the spread of typhoid fever.

If the knowledge of the *bacillus typhosus*, or bacillus of Eberth, has not yet given a complete explanation of the pathogeny of typhoid fever, it has, nevertheless, enabled us better to understand this affection and better to

* A second series of "New Medications," published in 1887.

† From advance sheets, revised by the author (translated by E. P. Hurd, M.D.). Lectures delivered in Cochin Hospital, Paris, France.

‡ Member of the Academy of Medicine, Physician to the Cochin Hospital, Paris, France.

combat it. As has always been the case in the discovery of the micro-organisms of disease, it is prophylaxis which has most profited by this discovery. We know to-day that the most active instrumentality in the propagation of typhoid fever is the usage of waters which have been fouled by the dejections of typhoid patients, waters which become a culture medium favorable to these micro-organisms. In all the epidemics which we observe to-day, it is always in the water that we find the contagious element; this infectious agent we can cultivate so as to make its presence unmistakable; and in the remarkable discourse which Brouardel recently delivered at the Academy of Medicine (November 11, 1890), during the discussion on depopulation, you will find facts and statistics which make this mode of propagation no longer questionable.

Is this the sole means of propagation of the disease? It will by no means do to affirm this. In an excellent monograph on "Typhoid Fever in the Army,"* Kelsch shows clearly the complexity of the factors concerned in this disease, and the divers conditions in which, either acting singly or in co-operation, they effect their result. To water, so often instrumental in conveying the contagion, we must add the accumulation of organic matters on the floor of barracks or in the holds of vessels; then telluric agencies,—*i.e.*, the influence of the soil,—as when the earth is dug up in the construction of the sewerage-works of cities, and when in army life a large number of soldiers are obliged to camp on the ground. In his remarkable Reports to the Academy, Lardier, of Rambervillers, has instanced undoubted cases of contagion and propagation of typhoid fever where the drinking-water had no agency whatever.

So, then, while recognizing the fact that we have in contaminated water the most important factor of dotninenteritis, we must admit that there are other factors quite as active. Lastly, in order that the bacillus may develop, a favorable culture soil is necessary, and the best is that state of depression of the economy produced by overwork and exhaustion.

I have already had a good deal to say on this subject in my "Prophylactic Hygiene," and I have endeavored to show that if overwork brings about a typhoid condition and favors the development of the *bacillus typhosus*, the presence of the latter is necessary to characterize typhoid fever, and that it is important to distinguish the typhoid states due to overwork from typhoid fever proper, the first being the result of a blood-poisoning,—*i.e.*, the penetration of toxines in the economy,—the second the result of an infection, or rather of a toxic infection, as the *bacillus typhosus* secretes a very active toxine, described by Brieger. under the name of *typhotoxine*.

Prophylactic hygiene has utilized all these data, and we see to-day all our cities giving particular attention to the potable water of their inhabitants. This is a matter on which I had something to say in a previous lecture (see THERAPEUTIC GAZETTE, 1889, p. 365).

From these data, which may be now considered as facts of science, there flow certain practical consequences to both public and private hygiene. Public hygiene is enlightened thereby as to the necessity of furnishing pure water to the inhabitants of towns and cities. As for the application of these facts to private hygiene, individuals everywhere recognize, or should recognize, the obligation to destroy as promptly as possible the dejections of persons affected with typhoid fever, and to disinfect all places fouled by these dejections.

So, whenever you are in the presence of a case of typhoid fever, you should formulate a series of precautions, to be rigorously observed by those whose business it is to attend on the sick, or to be much with them. For the disinfection of the stools, I would recommend particularly the sulphate of copper, of which you will have two solutions,—one strong, the other weak. The strong solutions contain 50 grammes (about 1⅔ ounces) to a litre (about 1 quart) of water; the weak, 12 grammes (about 3 drachms) to the litre. The first will serve for the stools, and you will see that the vessel which receives the dejections shall always contain a certain quantity of this solution. This same solution will serve, moreover, for the disinfection of soiled linen, and for the purification of the water-closets.

The weak solution will be utilized for washing the hands and face of those who take care of the patient, as well as the parts of the cutaneous surface of the patient which have been fouled by his dejections. You will recommend to the nurses and attendants not to eat in the sick-room. You will also advise them to wash their hands whenever they touch the

* *Revue d'Hygiene*, August and September, 1890.

patient. Lastly, it will be necessary to send to the disinfecting stoves (heated by steam under high pressure, which the municipalities are endeavoring to establish to day in the different cities) all objects which have been in contact with the patient.

When people are not sure of the purity of the water which they drink, they ought to boil it, or use the sterilized water of commerce, which, owing to the facilities for its production, may be now procured at a very low price. Apparatuses for the sterilization of water are now very common; one kind much in use is portable, and can be transported at any time to the centre of an infected district.

I do not speak of filtered water, and for this reason. The cylindrical water-filters (called Chamberland filters) constitute an immense progress towards the obtention of water of absolute purity; but it is not enough to have simply the Chamberland filter; it must be perfectly well made, and free from all cracks and pores. These filters must, moreover, be kept perfectly clean,—*i.e.*, exposed to a hot fire every week or two,—a precaution rarely observed by persons who possess them, and who, confiding in the assertions of the dealers, believe that it is not necessary to cleanse the filter to have healthful water, which is a mistake. Lastly, there is a question much more grave,—Do these filtering "bougies," which oppose the passage of microbes, offer a sufficient barrier to the toxines secreted by the microbes? This point has not yet been well demonstrated.

Boiled water presents none of these evils. Boiling destroys both the microbe and the toxines. It has been asserted that these boiled waters are indigestible; this objection has really little validity, and a recent work of Guinard has made this clear.* Guinard has shown that boiling really lowers the hydrotimetric † degree of the water of the Rhone and the Saône, but without depriving these waters of all their calcareous principles, though it does this with well-waters; but here it is an advantage, as boiling rids the water of its carbonate of lime. Moreover, the following table shows you these differences:

	Hydrotimetric degree.		
Source of the water.	Before boiling.	After fifteen minutes of boiling.	Difference.
Rhone water delivered at Lyons	15.5°	12°	3.5°
Saône water	16°	11°	5°
Well-water	52°	34°	18°

As for the gases of the water, ebullition, even when prolonged, does not completely expel them, and, moreover, the water very rapidly recovers these gases. The following figures, borrowed from Guinard, show this.

Before the action of the heat, 100 cubic centimetres of Rhone water contained 5.4 c.c. of gases, resolvable into

	C.c.
Carbonic acid	1.1
Oxygen	1.3
Nitrogen	3.0

After forty-five minutes of boiling, this water contained, still after cooling, 1.9 c.c. of gases, found to be

	C.c.
Carbonic acid	0.3
Oxygen	0.5
Nitrogen	1.1

The same water, after twenty-four hours of exposure to the air in an open place, had absorbed a new quantity of gases, and contained

	C.c.
Carbonic acid	0.3
Oxygen	1.1
Nitrogen	3.5

You see, then, that boiled water may redissolve a certain quantity of gases which it takes from the surrounding air. You see, moreover, that by prolonged boiling it is impossible to deprive water completely of its gases. So, then, in cases of doubt, advise the use of boiled water or of sterilized water.

I come now to the study of the new ways of treating typhoid fever.

The putridity of the intestines plays a considerable *rôle* in typhoid fever, and the denomination of *putrid fever*, formerly given to this affection, is perfectly correct in the light of modern researches.

This putridity results from the particular state of the digestive tube and the numerous ulcerations which develop there, resulting sometimes even in sphacelus of a portion of the mucosa. Hence the fetidity of the stools is a constant characteristic of typhoid fever. Physicians, of late years, have tried hard to counteract this putridity, and we are especially indebted to Bouchard for enlighten-

* Guinard, *Lyon Médicale*, August 10, 1890.

† The *hydrotimeter* is an apparatus for the qualitative and quantitative analysis of water. It determines the quantity of lime salts by the aid of a solution of soap (Robin).—Tr.

ment as to the best means of intestinal antisepsis in typhoid fever.

Various agents have been tried. Bouchard first proposed charcoal, then iodoform, then naphthalin, finally naphthol, and it must be admitted that the latter agent is much superior to those first mentioned.

There are, as you know, two kinds of naphthol,—one more soluble, less toxic, but more irritant, *α* naphthol; the other, less soluble, more toxic, but less irritant,—viz., *β*-naphthol. It is to the latter that Bouchard has given the preference, and he associates the naphthol with salicylate of bismuth, under the form of powders or granules, and gives them in such a way that the patient shall take daily from fifteen to thirty grains of naphthol.

To day, in my judgment, naphthol should be abandoned, and salol substituted in its place, and for this reason: Naphthol is always irritant; is often badly borne. Salol, on the contrary, is much better tolerated. Moreover, this salicylate of phenol is a medicament which is not decomposed until it reaches the intestines. It is the disinfectant *par excellence* of the intestines, and has been so far useful from this point of view, as in patients afflicted with artificial anus, to do away with one of the most serious inconveniences attending that infirmity by destroying the odor of the fæcal matters constantly flowing through the fistulous opening. It is, then, to salol that you should resort, and I add that salol is but slightly toxic.

In some experiments made in 1887 with Dubief, and detailed in the thesis of my pupil, Dr. Lombard,* we demonstrated that it is necessary to give to a rabbit salol in the proportion of one gramme per kilogramme of weight to produce death.

Salol has an odor which is sufficiently agreeable; not being soluble, it has no savor; and you can administer it in capsules, or, what is better, in suspension in an appropriate vehicle. The quantity to be given in the twenty-four hours should be between 2 and 4 grammes (½ to 1 drachm). You can add, if you wish, salicylate of bismuth.

To practise disinfection is not enough. You must also combat the febrile element, and this is one of the most interesting and important points in the question before us. During the last few years a great number of active antipyretic agents have been discovered, which constitute that series of antithermic medicines of which I have so often spoken. These medicaments have been applied to the treatment of typhoid fever, and we see a great number of our *confrères* attribute to them a real value. I confess that I cannot share this confidence.

The hyperthermia in dothinenteritis is but one manifestation of the general state of the patient, and to believe that in lowering the temperature you are going to get rid of the gravity and intensity of the disease is a profound mistake. We see, on the one hand, very grave cases of typhoid fever without hyperthermia; and, on the other hand, we can, by our antithermic medicines, keep down the temperature of the patient to the normal during the entire course of the disease without diminishing for an instant the gravity of the affection. If I add that the most of these antithermics diminish the urinary secretion, and thereby oppose the elimination of the toxines which are produced in so great quantity by the febrile state, we shall have, I believe, sufficient reasons to be very reserved in the administration of these antithermic analgesics in typhoid fever, and I fully agree in this respect with Cantani in his communication made to the Berlin Congress.†

Ought we to have the same reserve in respect to the employment of cold baths,—of tepid baths? As for cold baths, I have many times given my conclusions as to their therapeutic value, both in my "Clinical Therapeutics"‡ and in this journal,§ and the recent facts which our colleagues of the hospitals have communicated, and in particular Juhel-Renoy, Merklen, Josias, etc., have not modified my opinion.

The cold bath is a good therapeutic agent; it not only opposes the hyperthermia, but especially the disturbances of the nervous system. What I have especially combated is the systematization of Brandt's method; and I shall return to this point by and by when I come to speak of the statistical results of the different methods of treatment employed.

If you do not see me prescribe cold baths as a routine measure of practice in my hospital, it is because I find in lotions, wet packings, and especially in tepid baths, the same advantages as in cold baths, without the inconveniences of the latter. Tepid baths constitute an excellent method of treatment in

* "Researches on Salol" (*Thèse de Paris*, 1887).

† Cantani, Congress of Berlin, 1890, and *Bulletin Général de Thérapeutique*, t. cxiv., 1890.

‡ "Clinical Therapeutics," Detroit ed., art. "Typhoid Fever."

§ THERAPEUTIC GAZETTE, 1887, p. 803.

typhoid fever, and by tepid baths I mean such as have a temperature of 30° to 32° C., and present a difference of about 10° from the body temperature of the patient. I obtain with these tepid baths sedation of the nervous disturbances, a sufficient fall of the temperature, and a state of freshness of the skin, and general comfort, which enables the patient to get the needed rest. This is the order that I generally follow when prescribing baths and ablutions:

I begin by lotions; then, if the temperature exceeds 40° C., I give tepid baths, one or two a day, according to the thermometric indications; the duration of the bath should be from twenty to thirty minutes, and, when the patient is feeble, I give him stimulating drinks while he takes his bath. If a very intense ataxo-adynamia supervenes, I wrap the patient in a wet sheet. The duration of this wet-wrapping should never exceed thirty seconds.

To terminate what pertains to the fever, I shall speak of sulphate of quinine and of benzoate of sodium. Of all the medicaments applied to typhoid fever, sulphate of quinine has the best withstood the attacks which have been made against the pharmaceutical treatment of this disease.

If we have abandoned the large doses of quinine and content ourselves with only medium doses, amounting to one gramme per day, we none the less consider quinine as one of the best medicaments ever used in typhoid fever; and we see certain of our colleagues, Grancher in particular, maintain that the salts of cinchona have an action really specific in dothinenteritis, especially when this disease affects children. I do not altogether adopt this view. At the same time I recognize that quinine is a medicine which finds its place in a great number of cases of typhoid fever.

Albert Robin has shown himself the most earnest advocate of the use of benzoate of sodium in typhoid fever. He has, in fact, proposed a new theory of typhoid fever based on the following circumstances: In typhoid fever there is not augmentation but diminution of the oxidations, with exaggeration of organic disintegration. The oxidations, as I have said, are lessened, and this hinders the combustion or modification of the waste matters which result from the increase of the disintegration. Moreover, the different emunctories being affected, the toxines and the waste elements of disintegration encumber the economy. According to this theory, the crises, favorable or unfavorable, result from either the more active elimination of these products or their retention. Hence, all medicaments which are capable of energizing the combustion of the organic *débris* should be advised.

Robin mentions especially salicylic and benzoic acids; he gives daily 30 grains of benzoic acid or 60 grains of benzoate of sodium. I do not know that the method of our colleague has come into very general use, and if salicylic acid and the salicylates are still prescribed, it is rather that they may act as disinfectants. As for benzoic acid and its derivatives, it is but little employed.

All these means of which I have just spoken may furnish two orders of therapeutic agencies,—the one systematic,—*i.e.*, applicable to all cases; the other, to be applied according to indications.

Certain authorities have systematized the cold baths; others, like Bouchard, antisepsis, with the tepid baths; others employ only the salicylate of bismuth, etc. I am a thorough opponent of systematization.

For a disease like typhoid fever, which presents itself under the most variable forms, we cannot admit a therapeutic formula which applies indiscriminately to all cases, and our treatment should vary according to the patient whom we have before us. We may truly say that there is no treatment of typhoid fever, but a treatment of typhoid patients, and this I shall endeavor to prove to you by the recent statistics furnished by the practice of our Paris hospitals.

In a very interesting communication made by Merklen* to the Society of the Hospitals, on the results of the divers treatments of typhoid fever in the hospitals of Paris, you will find statistics of great value, and the first point to which I would call your attention is that, taken in its entirety, the mortality varies according to the periods; sometimes it rises, sometimes it falls. Thus, in the period extending from 1868 to 1882, the mortality in the hospitals from typhoid fever was twenty-one per cent. From 1882 to 1888 it fell to fourteen per cent., and in 1889 it was thirteen per cent., and this whatever kind of treatment was employed. We may even say that in 1890 it is still lower, being not more than twelve per cent.

This mortality does not affect equally both sexes, and, as Hayem has remarked, the figure

* Merklen, "The Treatments and the Mortality of Typhoid Fever in the Hospitals of Paris" (*Bull. et Mém. de la Soc. des Hôp.*, July 9, 1890, p. 628).

of the mortality of women is much larger. Juhel-Renoy makes this difference,—viz., twelve per cent. for women, five per cent. for men. The mortality of women, then, is more than double that of men.

Has the treatment, then, any influence on this fall of mortality? The difference is very slight, that is as far as our hospitals are concerned.

If we take as the basis, for instance, the year 1889, we find for the total mortality,—military hospitals, general hospitals, and children's hospitals,—with the symptomatic treatment, 11.33 per cent.; and with the systematic treatment by cold baths, 11.28 per cent. The lowest mortality was obtained in 1889 by the combined employment of quinine and tepid baths, being 7.33 per cent. But Debove has shown how careful we should be in in drawing such conclusions, since by almost absolute expectancy, only a hygienic treatment being employed, the practitioner at the Hospital Andral has had a mortality of only 9.2 per cent.*

Moreover, in a recent communication, Merklen has brought clearly to view a fact on which I had long dwelt in my "Clinical Therapeutics,"—viz., the difficulty of basing therapeutic conclusions on statistics, and you will permit me to repeat what I said ten years ago in the first edition of that work. After citing the remark of Forget,—"Statistics are like an obliging girl, who gives herself up to the first comer,"—I added, with reference to typhoid fever, "Do you believe that one typhoid patient is exactly like another typhoid patient?" The age of the patient, the state of his vital forces, the relative severity of the epidemic, the period of the year, the nature of the locality even, have a great influence on this pathological aggregate, and modify its march and its fatality. It is here especially that we see the influence of what I have called the morbid genius of epidemics, where one sees epidemics relatively benign succeed epidemics that were relatively malignant; and according as you employ the same method of treatment to the first or to the second, you will have multiplied successes or failures.†

I find a confirmation of these views in the discussion which took place at the Society of the Hospitals, where Merklen showed the variations of the mortality according to epidemics.‡

With regard to this variable mortality of epidemics of typhoid fever, is it in contradiction with the recent data which we have acquired concerning this disease? By no means. What, in fact, does bacteriology show us? It puts in clear light this fact, that the virulence of the products secreted by the microbes is variable according to multiple circumstances, and it is probable that under certain conditions, of which the knowledge still escapes us, the *bacillus typhosus* acquires extraordinary virulence. If, we add, in accordance with the teachings of Koch, the gravity varying according to the soil on which this microbe is cultivated, debility of the organism, overwork and exhaustion, insufficiency of alimentation, etc., we shall have the explanation of this variation in the mortality by typhoid fever, which we have before ascribed to the "morbid genius," confessedly a vague and indeterminate word.

What conclusions shall we draw from all this? This,—namely, that nothing in the facts of the case warrants the advocates of systematic medications in affirming the superiority of their method over the symptomatic modes of treatment, and that here, as in many other things, it is the attention which the physician shall give to the patient whom he treats, it is the promptness and the rigorousness with which the treatment shall be applied, it is the celerity with which he shall combat the varied symptoms which appear in the course of typhoid fever, which constitute the success of the treatment employed, whether the latter be systematized or not.

But, however important the part which you may assign to this systematization, do not forget that there are still three elements of success which ought always predominately to enter into your therapeutics,—the disinfection of the intestinal contents, the promotion of an abundant diuresis, and a most scrupulous attention to the hygienic needs of the patient.

As to the first point, I need not repeat what I have already said. Salol is the medicament which seems to me best to fulfil this indication.

As for the matter of diuresis, I adopt in this regard the views of Albert Robin, and believe that it is useful to favor as much as possible the elimination of the products of

* Debove, "On the Mortality from Typhoid Fever" (*Bulletin et Mémoires de la Société Médicale des Hôpitaux de Paris*, July 25, 1890).

† "Clinical Therapeutics," G. S. Davis, Detroit, Mich., p. 381.

‡ Merklen, "The Variations in the Mortality of Typhoid Fever" (*Bull. et Mém. de la Soc. Méd. des Hôp.*, October 30, 1890).

organic disintegration ; and as the most active channel for this elimination is the kidney, it is necessary to give our patients abundant drinks to favor diuresis. I believe even that the success obtained by Debove by expectancy is due to the fact that he always requires his patients to drink abundantly. Unhappily, in grave cases, the bad condition of the mouth, and the fuliginosities which encumber it, joined to the state of prostration and delirium into which the patient is plunged, often render the administration of beverages very difficult. The drink which I prefer is fresh vinous lemonade, which may be iced if one wish.

Lastly, this great question of hygienic attentions dominates the entire therapeutics of dothinenteritis, and explains the marked difference which exists between the mortality of the hospitals and that of private practice. Despite the painstaking and devotion of our hospital nurses and attendants, it is impossible to give our patients in those public institutions the scrupulous attention which we can exact in private practice, especially among rich people. In private practice, such factors as the ablutions, the constant cleansing of the mouth, the disinfection of the excreta, the excellent ventilation of the sick-room, the plentiful supply of nurses,—new and fresh ones taking the place of those that are tired out, and the patient never being left an instant unattended,—all this constitutes so many chances of success, which give the patients of the better classes in private practice the advantage over hospital patients.

Such are the considerations which I desired to present in connection with the treatment of typhoid fever. They show on this special point the indubitable progress of therapeutics. In the next lecture, which will finish the conferences of this year, I shall take up a subject on which there has been a great deal of discussion of late, and which may be considered as being yet far from settled. I refer to "Hypnotic Suggestion in Therapeutics."

A STUDY OF THE PHYSIOLOGICAL ACTION OF KAVA-KAVA.

By David Cerna, M.D., Ph.D., Philadelphia, Pa.*

THE plant known by the names of ava, kawa, yagnona, ava-ava, kara, kava, and kava-kava is the *Piper methysticum*, of the natural order of *Piperaceæ*. It is cultivated in the Fiji, Hawaiin, and other islands. While several varieties are known to the natives, the most active properties are exhibited by those species of the plant which grow on dry soil.

The plant possesses stimulating but not, as has been frequently stated, intoxicating properties. The preparation used by the natives is made exclusively from the root. As such it is said to possess, like coffee, a primary stimulating effect. Kesteven† has remarked: "A night's carouse, however, from kava-kava, as frequently indulged in by the natives, impairs the function of locomotion, and you have the curious spectacle of a man utterly drunk in his walk, while his intellect is unclouded ; he is unable to control the movements of his legs, but is perfectly aware of his disability. When the effects have passed off, there remain no after-consequences,—*e.g.*, 'hot coppers,' 'sore heads,' are unknown as a result of kava-drinking."

The first investigator to make a study of the racine of kava-kava was Morson.‡ Ignorant of his observations, Guzent, Gobley, and O'Rorke,§ years later, made a study of the same racine. But the first observer to present a more or less thorough analysis of the kava resin was Gobley,‖ who gave to the active principle of the drug the name of *methysticin*.

Dupuy,¶ in a recent thesis, has stated that the kava plant contains a resin which seems to constitute its essential therapeutic principle.

Besides a crystalline, non-nitrogenous substance, designated as *kavahin*, extracted from the *Piper*, a second body has been determined by Noelting and Kopp,** which appears to be the same as the one worked out by Lewin.††

According to Guzent,‡‡ the root of the kava, of which nearly half of its weight is made up of starch, contains an essential oil of a pale yellow color, two per cent. of an acrid resin, and about one per cent. of a neu-

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* Assistant in Physiology in the University of Pennsylvania.

† London *Practitioner*, 1882; also Therapeutic Gazette, May, 1882.

‡ London *Pharmaceutical Journal and Transactions*, 1844, p. 472.

§ *Journ. de Pharm. et Chemie*, 1860, vol. xxxvii. p. 20.

‖ Loc. cit.

¶ *La Tribune Médicale*, April 13, 1879.

** *Le Moniteur Scientifique*, vols. xvi., 3d Series, and iv., 1874, p. 920.

†† *Berliner Klinische Wochenschrift*, January 4, 1886.

‡‡ Therapeutic Gazette, April, 1881.

ral crystalline principle called *kavahin* or *nethysticin*, which is obtained in acicular crystals by crystallization from a concentrated tincture. This principle is said to differ from cubebin and piperine in its being colored red by hydrochloric acid, which color fades into a bright yellow on exposure to air, and also in being colored purplish violet by strong sulphuric acid, this passing subsequently into green.

The body produced by Lewin was the one termed by him *yangonin*, and is said to be also free from nitrogen.

Lewin has found both substances—*kavahin* and *yangonin*—inactive by themselves. But to a resinous body, *alpha-kava*, extracted from the root by means of alcohol, and which contains both principles, he ascribes the active qualities of the drug.

Randolph * ventures to call this alpha-kava of Lewin, *lewinin*. The effects of this resin are similar to those produced by the crude plant.

Again, it has been observed that a watery infusion of the drug produces the same characteristic effects, so that the medicinal properties of kava-kava are due neither to the resin alone nor to the other chemical constituents.

From the chemical evidence so far brought forward, imperfect as it is, it may fairly be stated that no true active principle has yet been isolated from kava-kava, the composition of which certainly requires further and more thorough investigation.

PHYSIOLOGICAL ACTION OF KAVA-KAVA.

General Action.—For purposes of experimentation I have employed exclusively the fluid extract of kava-kava, an excellent preparation furnished by Messrs. Parke, Davis & Co., of Detroit, Mich.† From my own, and from the general experiments of Lewin, Dupuy, and Randolph, the following effects are noticed: Taken internally or through hypodermic injections, the drug produces an increased flow of saliva, a burning sensation in the mouth, followed by a marked numbness, a general depression of nearly all the normal functions, and lastly paralysis, this being most noticeable in the hind extremities, especially in the case of the frog. In a completely paralyzed batrachian, under the influence of the drug, mechanical, thermal, chemical, or electrical irritations produce no effect; although in every case, after death, faradization of both nerves and muscles produces the corresponding contractions, showing that these tissues remain unaffected. Simply placed on the tongue, the drug produces a momentary burning sensation, with increased secretion of saliva, which is soon followed by a local numbness, lasting for over an hour. After a short time the increased secretion of saliva and the decreased sensibility of the mucous membrane of the mouth and throat cease. The same results are observed on the conjunctiva and cornea. When the drug is directly applied to these parts, sensibility is lost in a very short time, and this condition, which allows the eye to be irritated and even scratched without the animal evincing any signs of pain, lasts for a considerable time.

The great muscular weakness observed in the higher animals, under the action of the poison, is undoubtedly of spinal origin, as the superior nerve-centres retain, in these circumstances, their normal functional activity, especially in the case of man.

Moderate quantities produce stimulating effects, especially on the central nervous system. Small and larger doses depress the circulatory system; and, finally, in sufficiently poisonous amounts, kava-kava produces death through failure of the respiration or through cardiac paralysis, especially the former. (See Experiments 12 and 20.)

To obtain a more accurate knowledge of the subject, I shall proceed to make a study of the action of the drug on the different systems separately.

ON THE NERVOUS SYSTEM.

On the Sensory Nerves.—One of the most characteristic effects produced by kava is the loss of local and general sensibility. This comes on soon after the injection of the poison, but in a certain period of time it completely disappears, even when the muscular weakness or paralysis is still noticeable. The local anæsthesia produced around the point of injection, however, persists for a long time after the disappearance of all other symptoms.

The following experiments explain themselves:

Experiment 1.—Large frog. Injected hypodermically, at 3.30 P.M., 5 drops of fluid extract of kava-kava; 3.50, sensation very much impaired and animal lies perfectly paralyzed; 3.55, continued in the same way; 4, sensibility is better, but paralysis is still complete; 4.20, sensation normal, as tested by simple

* *Medical News*, March 13, 1886.

† The drug was kindly placed at my disposal by Dr. S. Weir Mitchell and Professor H. A. Hare.

mechanical irritation, but the batrachian will lie in any position that it is placed.

Experiment 2.—Pup; weight, 10 pounds. Administered subcutaneously 2 drachms of fluid extract of drug at 1.15 P.M.; 1.30, animal exceedingly weak; sensation impaired; 1.45, lies perfectly paralyzed on one side; the animal, though severely pinched on any portion of the body, gives no evidence of pain; respiration slow and deep, and has a peculiar to-and-fro motion of his head; 2.30, continues weak and drowsy, but the loss of sensibility begins to disappear; 4.30, continues in the same paralyzed condition, but sensation appears normal now, as cries are elicited on being pinched. By 9 A.M. next day the pup had completely recovered, but in a small area around the point of injection the numbness was yet pronounced, as there the animal would bear severe pinching, and even burning, without evincing pain.

Experiment 3.—Medium-sized frog. Tied abdominal aorta, and waited for shock to pass off. 10.40 A.M., injected into anterior portion of body 10 drops of fluid extract of kava-kava; 10.50, the batrachian lies perfectly flaccid, and while local irritation of hind legs produces reflex movements, the same, applied to fore extremities, elicits no response; 11.25, complete general paralysis, but sensibility is apparently intact only in posterior extremities.

These experiments were frequently repeated, and similar results obtained. The drug, again, produces a decided anæsthesia of the mucous membrane of the mouth and throat, and of the conjunctiva and cornea, when locally applied.

Randolph* has stated that *lewinin* produces a prolonged local anæsthesia of the conjunctiva, especially after the use of cocaine.

All this evidence would seem to show that kava-kava affects decidedly the afferent or sensory nerves, especially their peripheral ends.

Reflex Action.—Kava-kava, in moderate and large doses, diminishes and finally destroys reflex action. This phenomenon is even observed in the lower extremities after previous ligation of the abdominal aorta. Again, reflex activity is diminished as quickly in the normal animal as in the one whose spinal cord has been previously severed high up.

The following experiments, which were variously repeated, show this:

Experiment 4.—Frog. Destroyed brain, and, after the shock had passed, reflex action, as tested with acidulated water, was manifested in ten seconds. At 1.20 P.M. gave hypodermically 5 drops of fluid extract of kava-kava; 1.30, reflex action in thirty seconds; 1.35, reflex action in thirty seconds; 1.40, reflex action in twenty seconds; 2.30, reflex action in twenty seconds.

Experiment 5.—Large frog. Ablated cerebrum and tied abdominal aorta. After shock had passed, reflex action was shown in five seconds. At 1.5 P.M. injected 15 drops of fluid extract of kava-kava. 1.10, reflex action in twenty-five seconds; 1.12, reflex action in thirty seconds; 1.30, reflex action in one minute; 1.40, no reflex action in two minutes.

Experiment 6.—Two frogs—*A* and *B*—of equal size were used. *B* had cord cut high up, and waited for disappearance of shock. Both received into abdominal cavity the same dose—10 drops of the fluid extract of kava—at 2.35. Before injection, *A* showed reflex action in eight seconds, *B* in three seconds; 2.40, reflex action in *A* in ten seconds, in *B* in six seconds; 2.45, reflex action in *A* in fifteen seconds, in *B* in ten seconds; 3, reflex action in *A* in thirty seconds, in *B* in twenty-five seconds.

Experiment 7 gave similar results.

The fact, again, that neither muscles nor motor nerves are affected by the drug shows that reflex action is lowered, and finally abolished, through an action upon the sensory nerves and the spinal cord, chiefly the latter.

Paralysis.—The immediate and very pronounced paralysis produced by kava-kava, especially upon cold-blooded animals, is a constant effect.

It has been shown that this condition continues for a long time, even after general sensibility has been regained. As previous ligation of the abdominal aorta does not prevent the usual effect, it is evident that the paralysis is not due to a peripheral influence.

After death, both muscles and motor nerves respond readily to electrical stimulation, but the same faradic current applied directly to the exposed cord produces either very slight muscular contractions or none at all. These latter results are more noticeable when the drug is placed locally upon the spinal cord itself.

The following experiments—examples of many others performed—sufficiently explain themselves.

* Loc. cit.

Experiment 8.—Large frog. Destroyed brain and tied abdominal aorta. The shock having passed, injected in another portion of body 10 drops of fluid extract of kava-kava at 4.10 P.M; 4.15, movements exceedingly sluggish; 4.20, complete general paralysis ensues; 5.30, animal is dead. Carefully exposed spinal cord and applied electrical stimulus, but no response was elicited; the same current applied to nerve-trunks produced powerful contractions of tributary muscles; these likewise proved to be intact.

Experiment 9.—Medium-sized frog. Ablated cerebrum and carefully exposed spinal cord. After shock had passed, the cord responded very readily to weak faradic current. At 3.15 P.M., applied locally to medulla spinalis a few drops of the fluid extract of kava-kava; 3.40, animal is completely paralyzed; 3.45, muscles and nerves respond to moderate faradic current, but the same, and even very strong ones, applied directly to the cord, *fail entirely* to produce any effects.

The paralysis, then, produced by kava, is of spinal origin, and is due undoubtedly to an action of the drug upon the cord.

ACTION UPON THE CIRCULATION.

The action of kava-kava upon the circulation is very decided. Small, moderate, and large doses produce in the normal animal the same phenomena as regards the rate of the cardiac beat and the arterial pressure. Both are considerably diminished. In order to study how these changes are brought about, I shall consider the action of the drug upon the pulse and blood-pressure *seriatim*.

On the Pulse.—In all the normal experiments the reduction in the number of heart pulsations was found to be a constant effect. After small and moderate amounts, the cardiac rate gradually returns, in a short time, to the normal condition, but never goes above this. Under large and poisonous quantities, the reduction, with slight variations, is progressive until the occurrence of death.

It was observed, however, that notwithstanding the diminution in the rate of the pulse, the heart-waves were, in every instance, considerably larger, showing a decided cardiac stimulation.

This pulse diminution may be observed in the following experiments: (See Fig. 1.)

FIG. 1.

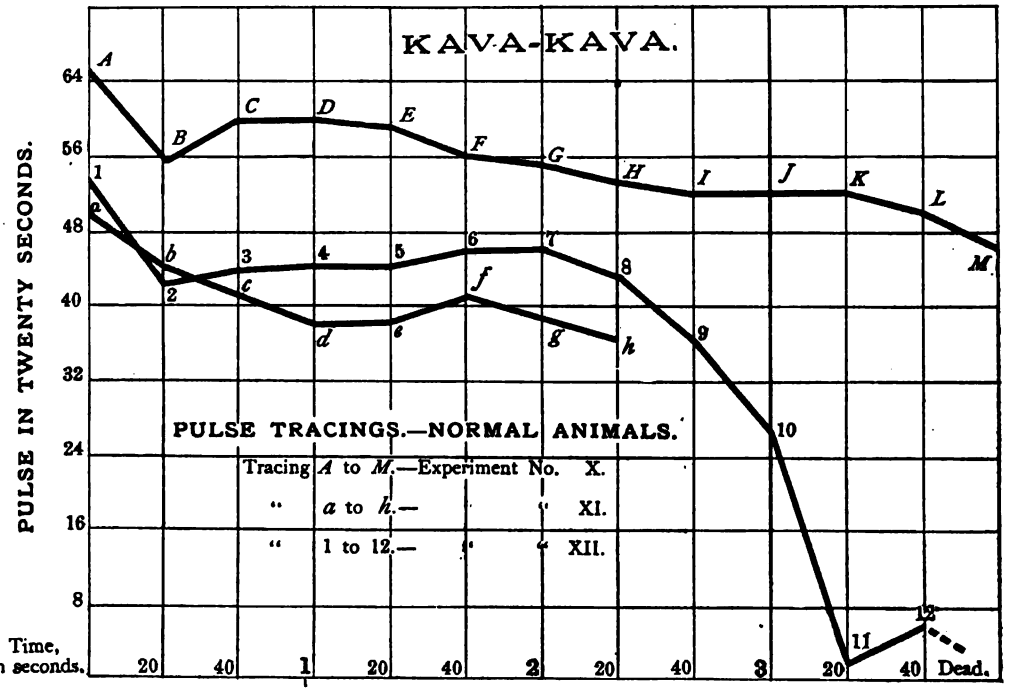


TABLE I.—*Experiment* 10.—Animal, dog; weight, 5 kilos.

Time. h. m. s.	Pulse in 20 secs.	Dose.	Remarks.
2.15.20	63	.....	Normal animal.
2.15.40	65	.....	
2.16	65	1 millilitre.	Injected into external jugular.
2.17	56	.....	
2.17.20	60	.....	
2.17.40	60	.....	
2.18.20	59	.....	
2.18.40	56	1 millilitre.	Second injection.
2.19	55	.....	
2.19.20	53	.....	
2.20	52	.....	
2.20.20	52	.....	

Time. h. m. s.	Pulse in 20 secs.	Dose.	Remarks.
2.20.40	52	1 millilitre.	Third injection.
2.21	50	.....	
2.21.05	46	.....	Animal dead.

TABLE II.—*Experiment* 11.—Animal, dog; weight, 3 kilos.

Time. h. m. s.	Pulse in 20 secs.	Dose.	Remarks.
10.10.20	54	.....	Normal animal.
10.10.40	50	1½ millilitres.	Injected into external jugular.
10.11	45	.....	
10.11.20	41	.....	Respirations exceedingly shallow.
10.11.40	38	.....	
10.12	38	.....	
10.12.20	41	.....	
10.12.40	39	.....	
10.13	36	.....	
10.13.15	...	.....	Animal dead; respiration and heart stopped at the same time.

TABLE III.—*Experiment* 12.—Animal, dog; weight, 5½ kilos.

Time. h. m. s.	Pulse in 20 secs.	Dose.	Remarks.
12.45.20	50	.....	Normal animal.
12.45.40	53	7 millilitres.	Injected into jugular.
12.46	43	.....	
12.46.20	43	.....	Respiration stopped.
12.46.40	43	.....	
12.47	44	.....	
12.47.20	44	.....	
12.47.40	46	.....	Eye reflexes gone.
12.48	46	.....	
12.48.20	43	.....	
12.48.40	36	.....	
12.49	26	.....	
12.49.20	2	.....	
12.49.40	6	.....	
12.50	...	.....	Animal dead.

TABLE IV.—*Experiment* 13.—Animal, dog; weight, 20 kilos.

Time. h. m. s.	Pulse in 20 secs.	Dose.	Remarks.
10.10	66	.....	Normal animal.
10.10.20	66	.....	
10.10.40	66	.....	
10.11	60	.....	
10.11.10	...	4 millilitres.	Injected into external jugular.
10.11.30	54	.....	
10.11.50	60	.....	
10 12.10	60	.....	
10.12.30	52	.....	
10.12.50	59	.....	
10.13.10	57	.....	
10.13.30	57	.....	
10.13.35	...	4 millilitres.	Second injection.
10.13.55	47	.....	Respiration stopped.
10.14.15	55	.....	
10.14.20	...	.....	Stopped drum half a minute.
10.15	55	.....	
10.15.45	34	.....	Stopped drum half minute.
10.19.45	...	.....	Heart stopped; ani dead.

No appreciable effect is produced by ka kava on the rate of the cardiac beats, af previous section of the pneumogastric nerv nor after division of both cord and vagi. several experiments performed, all of whi gave identical results, I only record the f lowing two: (See Fig. 4.)

TABLE V.—*Experiment* 14.—Animal, do weight, 10 kilos.

Time. h. m. s.	Pulse per min.	Dose.	Remarks.
12.10.20	189	.....	Vagi cut; canula troduced into chea; waited minutes before jection.
12.10.30	.....	2 millilitres.	Injected into exter jugular.
12.11.10	195	.....	
12.11.30	181	.....	
12.11.50	189	.....	
12.12.10	186	.....	
12 12.30	192	.....	
12.12.50	186	.....	
12.13.10	189	.....	
12.13.30	186	.....	
12.13.50	189	.....	
12.14.10	186	.....	
12.14.30	188	.....	
12.15.10	184	.....	
12.15.40	189	.....	
12.16.10	180	.....	
12.16.50	.....	.....	Killed with chl form.

TABLE VI.—*Experiment* 15.—Animal, do weight, 3½ kilos.

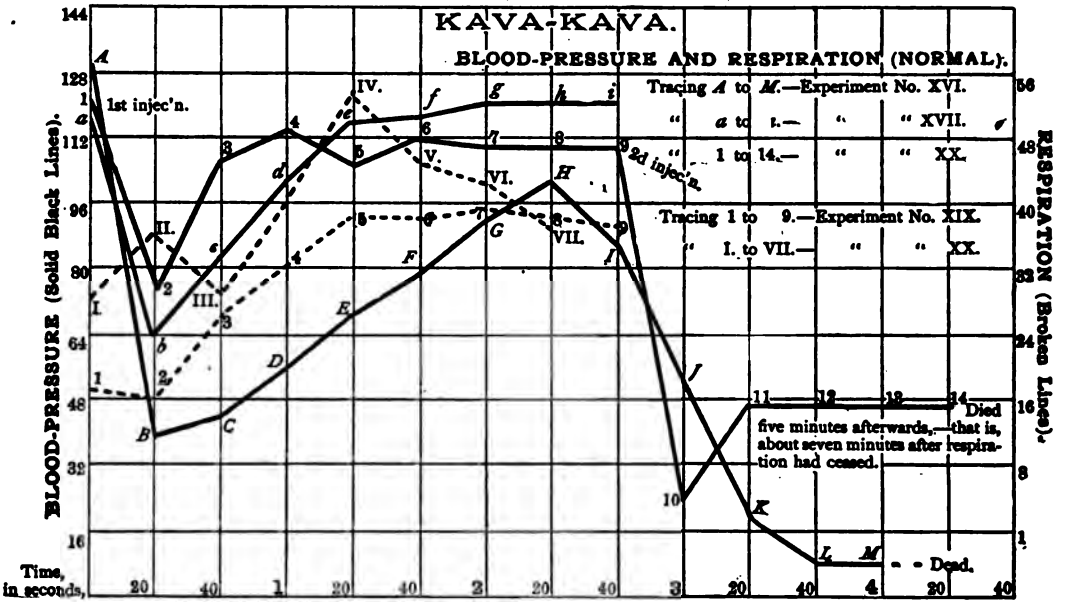
Time. h. m. s.	Pulse per min.	Dose.	Remarks.
4.06.15	230	.....	Cord cut in cervi region; vagi vided; artificial piration.
4.06.25	.....	2 millilitres.	Injected into exter jugular.
4.06.35	230	.....	
4.06.55	200	.....	Needle did not w accurately.
4.07.15	228	.....	
4.07.35	228	.....	
4.07.55	228	.....	
4.08.15	231	.....	
4.08.35	228	.....	
4.08.55	228	.....	
4.09.25	220	.....	
4.10.55	228	.....	
4.11.25	228	.....	
4.11.55	228	.....	
4.12.15	.....	.....	Killed with chl form.

In one experiment, where the spinal cord alone was previously severed, the drug produced the same depressing effects on the pulse-rate. Under these circumstances, section of the vagi, with immediate application of artificial respiration, was instantly followed by an increased cardiac action. This significant result, and the fact that no appreciable changes are produced in the heart-beats, after previous division of all the nerves going to the heart, would seem to prove that kava-kava diminishes the number of pulsations by stimulating the cardio-inhibitory centres.

On Blood-Pressure.—Pari passu with the reduction of the pulse-rate there is, in the normal animal, a distinct fall of the arterial

Time, h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
12.45	122–138	.....	Normal animal.
12.45.20	124–134	.....	
12.45.40	128–138	7 milli-litres.	Injected into external jugular.
12.46	36–44	.....	
12.46.20	42–48	.....	Breathing stopped.
12.46.40	52–60	.....	
12.47	66–72	.....	
12.47.20	74–82	.....	
12.47.40	88–96	.....	Eye reflexes destroyed.
12.48	96–106	.....	
12.48.20	80–90	.....	
12.48.40	48–60	.....	
12.49	10–30	.....	
12.49.20	8	.....	
12.49.40	8	.....	
12.50	...	.....	Animal died.

FIG. 2.


KAVA-KAVA.
BLOOD-PRESSURE AND RESPIRATION (NORMAL).
BLOOD-PRESSURE (Solid Black Lines).
RESPIRATION (Broken Lines).
Time, in seconds.
1st injec'n.
2d injec'n.
Tracing A to M.—Experiment No. XVI.
" a to l.— " " XVII.
" 1 to 14.— " " XX.
Tracing 1 to 9.—Experiment No. XIX.
" I. to VII.— " " XX.
Died five minutes afterwards,—that is, about seven minutes after respiration had ceased.
Dead.

pressure. Under small and moderate doses the pressure gradually rises again to its normal point, while under poisonous amounts the fall is followed by a rise (never to normal), or is steady until death takes place. In all these experiments a rise of the pressure above its normal height was at no period noticed. In only one, out of twelve experiments performed, where a small quantity of the medicine was employed (see Table IX., Experiment 18), a slight rise was observed at about three minutes, and again at about five minutes after the injection of the drug. The more usual effects, however, are seen in the following examples: (See Fig. 2.)

TABLE VII. — *Experiment* 16.—Animal, dog; weight, 5½ kilos.

TABLE VIII.—*Experiment* 17.—Animal, dog; weight, 10 kilos.

Time. h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
3.30	110–130	.....	Normal animal.
3.30.20	110–130	.....	
3.30.25	.....	2 milli-litres.	Injected into external jugular.
3.30.45	60–70	.....	
3.31.05	80–86	.....	
3.31.25	100–104	.....	
3.31.45	110–120	.....	
3.32.05	106–124	.....	
3.32.25	110–124	.....	
3.32.45	110–130	.....	
3.33.05	110–130	.....	
3.34.05	110–130	.....	

TABLE IX.—*Experiment* 18.—Animal, dog; weight, 5 kilos.

Time. h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
2.15	104	.....	Normal animal.
2.15.40	104	.....	
2.16	102	1 millilitre.	Injected into external jugular.
2.16.20	102	.....	
2.16.40	40	.....	
2.17	60	.....	
2.17.20	72	.....	
2.17.40	86	.....	
2.18	96	.....	
2.18.20	104	.....	
2.18.40	110	.....	
2.19	86	.....	
2.19.20	106	.....	
2.19.40	110	.....	
2.20	114	.....	
2.20.20	116	.....	
2.20.40	116	1 millilitre.	Another injection.
2.21	20	.....	
2.21.05	...	.....	Animal dead.

TABLE XI.—*Experiment* 20.—Animal, dog; weight, 20 kilos.

Time. h. m. s.	Dose.	Blood-pressure. mm.	Respiration per minute.	Remarks.
10	.....	110–118	84	Normal animal.
10.01	....	118–124	87	
10.01.10	12 millilitres.	.....	...	Injected into external jugular.
10.01.30	.....	62–70	108	
10.01.50	.....	100–110	81	
10.02.10	.....	114	120	
10.02.30	.....	120	159	
10.02.50	.....	112	135	
10.03.10	.....	110	126	
10.03.30	.....	110	114	
10.03.35	12 millilitres.	...	...	Another injection.
10.03.55	.....	24	...	Respiration stopped.
10.04.15	.....	46	...	
10.04.20	.....	...	...	Stopped drum half a minute.

FIG. 3.

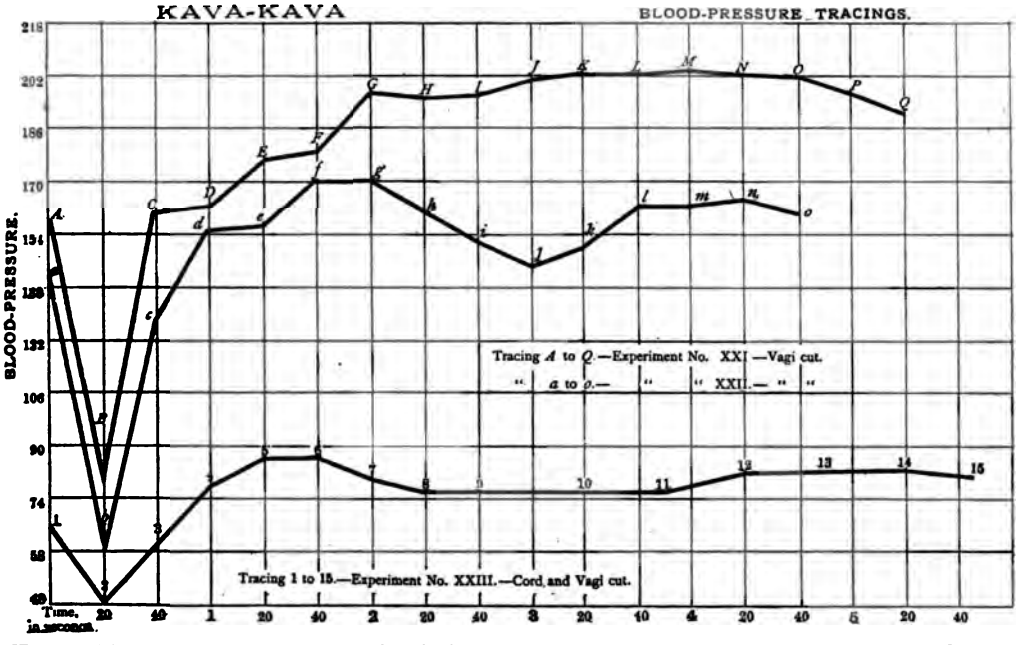

KAVA-KAVA
BLOOD-PRESSURE TRACINGS.
BLOOD-PRESSURE.
Tracing A to Q.—Experiment No. XXI.—Vagi cut.
" a to o.— " " XXII.— " "
Tracing 1 to 15.—Experiment No. XXIII.—Cord and Vagi cut.
Time, in seconds.

TABLE X.—*Experiment* 19.—Animal, dog; weight, 3 kilos.

Time. h. m. s.	Dose.	Blood-pressure. mm.	Respiration in 20 secs.	Remarks.
10.10	.....	74–80	...	Normal animal.
10.10.20	.....	64–74	17	
10.10.40	1½ millilitres.	64–70	16	Injection into external jugular.
10.11	.....	24	26	
10.11.20	.....	24	25	
10.11.40	.....	20	38	
10.12	.....	46	38	
10.12.20	.....	68	39	
10.12.40	.....	74	38	
10.13	.....	66	35	
10.13.15	.....	...	...	Animal dead; respiration and heart stopped at the same time.
10.05	.....	90	...	Stopped drum half a minute.
10.05.45	.....	80	...	Stopped drum one minute.
10.09.45	.....	...	...	Heart stopped; dog dead.

This action of kava-kava is prevented by previous section of the pneumogastrics. Moreover, after this operation, small and large doses invariably produce a rise of pressure. These results appear to show that the fall occurring in the normal animal is due to an overpowering influence exercised on the cardio-inhibitory centres. The drug certainly increases the power of the cardiac viscus, but that is masked by a more decided action on the inhibitory centres.

following experiments are appended: (See Fig. 3.)

TABLE XII.—*Experiment* 21.—Animal, dog; weight, 10 kilos.

Time. h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
12.15	150–170	.....	Vagi cut; canula inserted in trachea; waited ten minutes after operation.
12.15.20	150–170	.....	
12.15.30	.....	6 milli-litres.	Injected into external jugular.
12.15.50	70–90	.....	
12.16.10	160	.....	
12.16.30	160–170	.....	
12.16.50	166–186	.....	
12.17.10	170–188	.....	
12.17.30	190–204	.....	
12.17.50	186–208	.....	
12.18.10	186–210	.....	
12.18 30	190–210	.....	
12.18.50	190–214	.....	
12.19.10	190–214	.....	
12.19.40	190–216	.....	
12.20.10	190–214	.....	
12.20.40	190–212	.....	
12.21.10	190–202	.....	
12.21.40	180–200	.....	
12.21.50	.....	.....	Killed with chloroform.

TABLE XIII.—*Experiment* 22.—Animal, dog; weight, 3½ kilos.

Time. h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
4.05	106–130	.....	Vagi divided; canula in trachea; waited ten minutes after operation.
4.05.15	106–130	.....	
4.05.55	140–152	.....	Struggles.
4.06.15	136–150	.....	
4.06.25	.....	2 milli-litres.	Injected into external jugular.
4.06.35	60	.....	
4.06.55	130	.....	
4.07.15	150–158	.....	
4.07.35	152–160	.....	
4.07 55	170	.....	
4.08.15	170	.....	
4.08.35	152–168	.....	
4.08.55	152	.....	
4.09.25	144	.....	
4.09.55	150	.....	
4.10.25	162	.....	
4.10 55	162	.....	
4.11.25	164	.....	
4.11.55	160	.....	Eventually killed with chloroform.

Now, for the rise of blood-pressure, after previous section of the vagi, two important factors must be taken into consideration,—stimulation of the vaso-motor system, and a direct action on the heart either on its muscle or its contained ganglia. To determine this point the drug was administered after the production of the vaso motor paralysis,—that is, after division of the spinal cord; and also after section of both vagi, artificial respiration being maintained at the same time. Even in these cases kava-kava was still able to elevate the arterial pressure. Several experiments were performed with the same results, but to illustrate these I will only detail the following example:

TABLE XIV.—*Experiment* 23.—Animal, dog; weight, ———.

Time. h. m. s.	Blood-pressure. mm.	Dose.	Remarks.
11.20	50–60	.....	Cord and vagi cut; artificial respiration.
11.21.15	60–70	.....	
11.21.25	.....	2 milli-litres.	Injected into jugular.
11.21.45	48	.....	
11.21.55	60	.....	
11.22.15	74–80	.....	
12.22.35	76–80	.....	
12.22.55	86	.....	
12.23.15	86	.....	
12.23.35	76–84	.....	
12.23.55	76	.....	
12.24.55	76	.....	
12.25.25	82	.....	
12.25.55	82	.....	
12.26.25	82	.....	
12.26 50	80	.....	Killed with chloroform eventually.

TABLE XV.—*Experiment* 24.—Animal, dog; weight, 20 kilos.

Time. h. m. s.	Pulse per minute.	Blood-pressure. mm.	Respiration per minute.	Dose.	Remarks.
11.30	...	.....	...	.....	Vagi cut; canula in trachea; connection made with respiratory tambour ten minutes before injection.
11 40	...	124–144	...	.....	
11.40.20	180	124–144	51	4 milli-litres.	Injected into external jugular.
11.40.40	183	80–90	51	.....	
11.41	183	120–140	48	.....	
11.41.20	174	144–160	48	.....	
11.41.40	180	152–170	39	.....	
11.42	183	170–180	36	.....	
11.42.15	184	170–186	36	.....	Stopped drum two minutes.
11.44.15	...	180–190	...	.....	
11.44.30	188	180–192	32	.....	Killed eventually with chloroform

In some of the normal experiments, after the usual effects of the drug were produced, asphyxia and stimulation of the crural or sciatic nerve, with weak and strong electrical currents, were followed by a decided rise of the arterial pressure, showing that the vaso-motor system was intact.

No apparent effect was noticed when the drug was applied directly to the cut-out heart of the frog, or to the viscus *in situ*, which would lead me to exclude an action on the cardiac muscle; but the increase of the pressure, accompanied by a diminution of the pulse-rate, even after section of the vagi, would show stimulation of the heart-muscle. This rise, then, is due to an action on the heart itself.

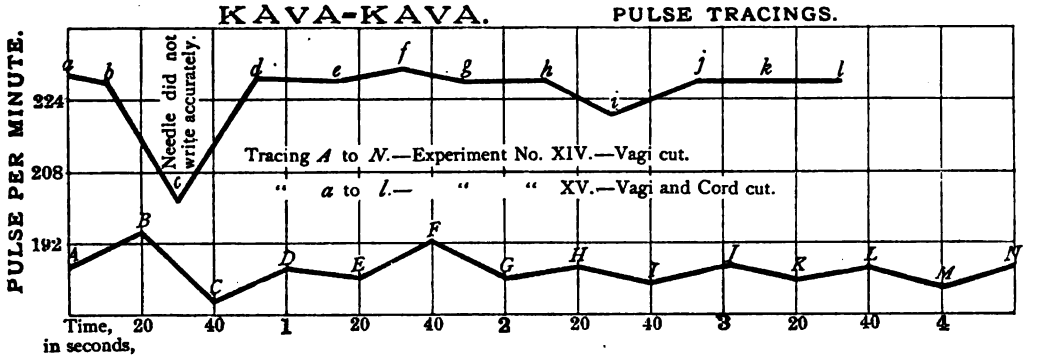
On the Respiration.—Kava-kava, in small, moderate, and comparatively large doses, is a powerful stimulant to the respiration. Poisonous quantities paralyze this function.

Time. h. m. P.M.	Rectal temperature.	Dose.	Remarks.
12.30	38.6° C.	.....	Animal quiet.
1.30	38.8° C.	.....	
2.30	38.6° C.	.....	
3.30	38.5° C.	.....	
5	38.7° C.	.....	

TABLE XVII.—*Experiment* 26.—Animal, small dog; weight, 2½ kilos.

Time. h. M.	Rectal temperature.	Dose.	Remarks.
12	39.2° C.	12 milli-litres.	Injected hypodermically.
P.M. 1	38.6° C.	.....	Animal perfectly paralyzed.
2	38.5° C.	.....	
3	37.1° C.	.....	Extreme weakness of hind legs, but paralysis has apparently disappeared.
4	37.6° C.	.....	Dog recovered.

FIG. 4.



These effects are seen in Experiments 19 and 20. The primary stimulation is not observed after section of the vagi, as is shown in Experiment 24, an example of many others performed. The behavior of the drug here is evident. The primary stimulation is due to excitation of the pulmonary peripheries of the pneumogastrics, the depression and final abolition of the respiratory function to an influence exercised on the centres situated in the medulla oblongata.

On Temperature.—In small doses kava-kava increases slightly the temperature. Large amounts diminish it. The two following examples will serve as illustrations:

TABLE XVI.—*Experiment* 25.—Animal, small dog; weight, 2 kilos.

Time. h. m. A.M.	Rectal temperature.	Dose.	Remarks.
11.30	38.0° C.	1 milli-litre.	Hypodermic injection.

From the foregoing study I am led to adopt the following conclusions:

1. Kava-kava produces general anæsthesia, and is especially a powerful local anæsthetic.

2. The drug diminishes, and finally destroys, the function of the afferent nerves, by affecting their peripheral ends.

3. Kava-kava diminishes, and eventually abolishes, reflex action, by influencing the spinal cord, and probably also the sensory nerves.

4. The paralysis produced by kava-kava is of a spinal origin, and is due to an action upon the cord.

5. Kava-kava, while increasing the force of the heart, diminishes the number of pulsations, by stimulating the cardio-inhibitory centres and ganglia, chiefly the former.

6. The drug lowers arterial pressure through an action upon the vagi. It afterwards elevates it, however especially after

previous division of the pneumogastrics, by a direct action on the heart.

7. Kava-kava at first stimulates, afterwards depresses, and finally paralyzes, the respiration. The primary stimulation is due to excitation of the pulmonary peripheries of the vagi; the latter effect to an influence exercised on the respiratory centres of the medulla oblongata.

8. Kava-kava, in small doses, increases slightly, and in large quantities diminishes, the bodily temperature.

9. The drug increases notably the salivary secretion.

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*THE RELATION OF ALBUMINURIA TO PUERPERAL ECLAMPSIA.**

BY WILLIAM S. GARDNER, M.D.†

IT has not been the object of the writer of this paper to speculate concerning the causes of either albuminuria or eclampsia, but to record a few observations that have some bearing upon the prognosis in cases of albuminuria during pregnancy, and also upon the possibility of the prediction of puerperal eclampsia. The observations include a report of the percentage of cases of albuminuria discovered in one hundred and eighty pregnant and parturient women, taken consecutively, and an abstract of the records of the cases of eclampsia occurring within the selected period.

The patients whose urine was examined were confined at the Maternité Hospital, Baltimore, between April 1, 1889, and August 1, 1890. The examinations of urine were made by Drs. Todd and Allen, resident physicians. The heat test and the nitric acid test, being undoubtedly the best tests for practical purposes, were used. The figures represent the volume of coagulated albumen which settled to the bottom of a test-tube, after a test-tube full of urine had been acidified with acetic acid, boiled, allowed to cool, and left to stand twenty-four hours, as compared with the quantity of urine boiled. Where a "trace" is recorded, it means a quantity that could have been readily detected by any one reasonably expert in urinary analysis.

The urine of each patient was examined soon after admission, and where albumen was once found, or where there were any indications that it was likely to be found, the urine was examined repeatedly up to the time of labor. Patients who were admitted to the hospital while in labor were necessarily exceptions to this rule. Urine from all patients was examined on the first and on the eighth day after labor.

QUANTITY OF ALBUMEN FOUND.

No.	Before labor.	First day after labor.	Eighth day after labor.	No. of child.
1.....	0	1/15	0	First.
2.....	0	1/10	0	Fourth.
3.....	1/10	1/8	0	First.
4.....	...	1/15	0	Second.
5.....	In labor 1/4.	1/15	0	Third.
6.....	...	1/15	Trace.	Fifth.
7.....	0	0	1/10	Second.
8.....	Trace.	0	0	First.
9.....	...	0	Trace.	First.
10.....	1/2	1/2	1/8	Second.
11.....	0	1/15	0	Second.
12.....	0	1/8	0	First.
13.....	0	0	1/15	First.
14.....	...	0	Trace.	First.
15.....	0	0	1/8	Second.
16.....	0	0	Trace.	First.
17.....	...	0	Trace.	First.
18.....	Trace.	0	0	Second.
19.....	0	0	Trace.	First.
20.....	1/4	1/4	1/4	Third.
21.....	0	1/4	0	First.
22.....	0	Trace.	0	First.
23.....	Trace.	0	0	Second.
24.....	0	0	1/8	Third.
25.....	0	1/4 in labor.	...	First.
26.....	0	1/8	0	First.
27.....	1/15	1/4	...	First.
28.....	0	0	Trace.	First.
29.....	0	Trace.	0	Fourth.
30.....	0	Trace.	0	Second.
31.....	0	1/8	Trace.	First.
32.....	0	Trace.	Trace.	First.
33.....	0	Trace.	0	First.
34.....	0	0	Trace.	First.
35.....	0	Trace.	1/10	First.
36.....	1/12	Trace.	0	First.
	8	22	17	

Thirty-four of the one hundred and eighty cases were in labor when admitted, so that it was not possible to examine their urine before labor. In the urine of the one hundred and forty-six cases examined, albumen was found eight times, or in about five and a half per cent. The urine from all cases confined was examined within twenty-four hours after

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labor, and albumen was found twenty-two times, or in twelve and two-ninths per cent. The urine from one hundred and seventy-seven patients was examined on the eighth day, and albumen found seventeen times, or in about nine and five-sixths per cent. Taking the whole one hundred and eighty cases, albumen was found one or more times in the urine of thirty-six, or in twenty per cent. Ninety-six of the patients were primiparæ; of these, albumen was found in the urine of twenty-two, or in twenty-three per cent. Eighty-four were multiparæ; of these, fourteen, or sixteen and two-thirds per cent, had albumen in their urine one or more times.

Included in the one hundred and eighty cases were four who had convulsions. This proportion is much greater than is ordinarily found, the rate, as is well known, being usually about one case of convulsions in five hundred pregnancies.

The following notes are abstracts of the records of the cases as kept by Dr. William J. Fodd and Dr. Samuel H. Allen, resident physicians at the Maternité:

CASE 1487.—Aged 20 years; primipara; admitted to the hospital March 28, 1889. Her urine was examined repeatedly before labor, and was always found to have a very low specific gravity, but perfectly free from albumen.

She was delivered at 4.40 A.M., May 25, 1889. Between 3.55 P.M. and 9 P.M. of that day she had fourteen convulsions. From May 26 to May 30 inclusive she had numerous convulsions, and passed large quantities of urine involuntarily, which, upon examination, was found to contain no albumen. She died at 9.40 A.M. May 30.

The autopsy was held next morning by N. G. Keirle. A small area of the lower lobe of each lung was in the first stage of pneumonia. The kidneys were small, flat, and lobulated. The other organs were found normal. Dr. Keirle gave the opinion that the cause of death was chronic interstitial nephritis.

CASE 1595.—Aged 23; primipara; was admitted to the hospital January 4, 1890. A specimen of her urine was examined January 11, with the following result: Specific gravity, 1020; acid reaction to litmus; no albumen. Since she had no œdema of the limbs, no headache, nor other symptoms pointing to a possible derangement of the kidneys, her urine was not again examined.

At 12.30 A.M., January 25, she had a convulsion, which was followed by twelve more before 2.15 A.M. Early in the forenoon labor came on spontaneously. There were no more convulsions until 7 P.M., when she had one, which was followed by the second at 9 P.M. A few minutes after nine she was delivered by short forceps of a dead child weighing six pounds. At 9.45 P.M. the convulsions again returned. She died at 12.55 A.M., January 27, forty-eight hours after the first convulsion.

After the first convulsions some urine was drawn from the bladder, and the examination gave the following result: Specific gravity, 1012; albumen, one-quarter per volume. The next day at noon the urine was again examined: Specific gravity, 1020; albumen, five-eighths per volume.

The kidneys were examined post mortem, and found to be very much congested, but the changes had not gone sufficiently far to say that they were inflamed.

CASE 1624.—Aged 19; primipara; admitted to the hospital March 12, 1890. She gave a history of having had dropsy subsequent to scarlet fever when a child. Her urine was examined March 14: Specific gravity, 1020; acid reaction to litmus; no albumen.

One week afterwards she complained of headache and sleeplessness, and her extremities were œdematous. Analysis of her urine revealed a trace of albumen. Her bowels were kept moving with saline cathartics, and she drank potassium bitartrate lemonade during the daytime. Under this treatment her headache disappeared entirely, she slept well, and was bright and cheerful. Her urine was examined March 21, April 5, 8, 10, and 19. At each examination a small quantity, never more than one-sixteenth per volume, of albumen was found.

Labor began about 9 A.M., April 25. The labor progressed slowly, but there was nothing unusual until the next morning at 9.25, the labor being in the second stage, when she had a convulsion; chloroform was given, and she was promptly relieved. After the effect of the chloroform passed off, she was perfectly rational, and said she felt much better.

After the convulsion her urine was examined, and one-fourth per volume of albumen was found, or four times as much as the largest quantity present at any previous examination.

During the afternoon she had a number of convulsions. After eight o'clock that evening there was complete suppression of urine. She died at 2.05 A.M. April 27. No post-mortem examination was allowed.

CASE 1658.—Aged 38; primipara; was admitted to the hospital June 9, 1890. Her feet were slightly swollen. Examination of her urine showed: Specific gravity, 1010; acid reaction to litmus; no albumen.

She was given a saline cathartic and potassium bitartrate lemonade.

Her labor began about 1 P.M., June 13, and was completed at 2 A.M. of the 14th. After she was put into bed, she said she felt well except a slight headache. At 5.15 A.M. she had a convulsion, followed by the second at 5.45 A.M. At half-past six four ounces of dark-colored urine were drawn off and analyzed: Specific gravity, 1028; acid reaction to litmus; one-third per volume albumen. At 9 A.M. she had a third convulsion. She was kept under the influence of chloral, and the convulsions did not return. Her urine was examined subsequently, with the following results:

Date.	Specific gravity.	Reaction.	Albumen.
June 15.....	1026	Acid.	None.
June 16.....	1024	Acid.	None.
June 17.....	1026	Acid.	Trace.
June 18.....	1032	Acid.	None.
June 19.....	1030	Acid.	None.
June 20.....	1030	Acid.	None.
June 21.....	1028	Acid.	None.

The following case, although it occurred at the Maternité, is not included in the list of one hundred and eighty, because she was not confined until after that list was completed, but I report it because of its bearing on the subject:

CASE 1682.—Aged 18; primipara; was admitted to the hospital August 2, 1890. The result of the analysis of her urine before labor was: Specific gravity, 1028; acid reaction to litmus; a trace of albumen. Her labor began August 19 about 9 P.M. The labor progressed favorably until 11.40 P.M., when she became suddenly unconscious, and was immediately seized with a convulsion, lasting about one minute. This was quickly followed by two more convulsions, the patient being perfectly rational in the intervals. A catheter was at once passed, and some urine drawn. Analysis of this specimen showed: Specific gravity, 1010; acid reaction to litmus; and no albumen. She was delivered of a living child at 1.16 A.M. August 20. She had seven more convulsions within the sixteen hours immediately following delivery.

The following are the results of further examinations of her urine:

Date.	Specific gravity.	Reaction.	Albumen.
August 20.....	1012	Acid.	Trace.
August 21.....	1022	Acid.	None.
August 23.....	1024	Acid.	None.
August 25.....	1030	Acid.	None.
August 27.....	1024	Acid.	Trace.

Briefly reviewing these cases, we find that Case 1487 was under observation almost two months, and, though her urine was examined frequently, a low specific gravity was always found, but never a trace of albumen. There was no headache, no œdema, nothing but the low specific gravity to indicate that the patient was not in perfect health. Yet in less than twelve hours after labor she began to have convulsions, which were continued until she died. These convulsions were not of the type usually observed, but resembled more closely the convulsions of hysteria, her body and limbs being thrown into the most grotesque contortions. Her urine was repeatedly examined, both before and after the convulsions set in, but no albumen was found at any time.

Case 1595 was under observation three weeks before confinement. No albumen was found in her urine before the accession of the convulsions, and there were no symptoms that gave warning of impending danger. After the first convulsions her urine was examined, and found to be one-fourth per volume albumen. The next day, there having been a number of convulsions in the interval, her urine was again examined, and found to be five-eighths per volume albumen, or more than double the quantity of the previous day.

Case 1624 gave a history that pointed to the probability that she had suffered from parenchymatous nephritis subsequent to scarlet fever. Under these circumstances her urine was examined with great care. The first examination showed a perfectly normal urine: a number of other examinations before labor each revealed a small quantity of albumen. During the second stage of labor she had a convulsion. Her urine was examined, and found to be one-fourth per volume albumen. Later there was complete suppression of urine.

Case 1658 was under observation four days before labor. Analysis of her urine gave no trace of albumen. More than three hours after delivery she had a convulsion, which was followed in half an hour by a second. One hour and a quarter after the first convulsion, analysis of her urine showed one-third per volume of albumen. Her urine

was examined each day for one week after the convulsions, and a trace of albumen found only one time.

Unfortunately, the urine from Case 1682 was examined but one time before labor, when a trace of albumen was found. As soon as the convulsions appeared a catheter was passed, and some urine drawn off, which must have been secreted before the convulsion. It was examined, and found to contain no albumen. Several hours afterwards her urine was again examined, and the presence of a small quantity of albumen was ascertained. Within the following week her urine was examined four times, and a trace of albumen found but once.

To make the statement general, in a series of one hundred and eighty consecutive cases, five and a half per cent. were shown to have albumen in their urine before labor, and more than twelve per cent. of them the first day after labor. Included in this series were four patients who were attacked by convulsions. Of the four, in only one case was the presence of albumen detected before labor; in three cases there was a large quantity of albumen present soon after the convulsions; in one case there was never any albumen present; and in one there was no albumen present twenty-four hours after the convulsions.

Elliot reports, in his "Obstetric Clinic," ten cases of puerperal convulsions, the urine from each of which was examined before the convulsions came on. In these albumen was discovered four times, and its absence was ascertained six times. In three cases there was no albumen in the urine, either before or after the convulsions.

In connection with the above cases are reported seven other cases of marked albuminuria, four of which died, but none had any convulsions.

Or, to put it in another way, he records eleven well-marked cases of albuminuria, only four of which had convulsions; and, on the other hand, there were six cases of convulsions where the urine was analyzed, but no albumen and no other signs of kidney lesions were discovered before the appearance of the convulsions.

Adding these cases to the ones already related, we have fifteen cases of puerperal convulsions. The urine from each case was examined before the convulsions appeared. Albumen was found six times, and it was not found nine times.

The number of cases here presented is too small from which to draw any definite conclusions; but if we are allowed to consider these to be average cases, we are warranted in drawing the following conclusions:

1. The presence of albumen in the urine of a pregnant woman is no sufficient cause upon which to base a prognosis of probable eclampsia.

2. The failure to find albumen in the urine of a pregnant woman is no evidence of the absence, or, at least, of the continuance of the absence, of the condition that gives rise to puerperal convulsions.

3. Albumen is so frequently found in considerable quantities in the urine of patients immediately after the appearance of puerperal convulsions, that we are justified in making the statement that the convulsions are the probable cause of the albuminuria.

HYPODERMIC USE OF ARSENIC.

By Harold N. Moyer, M.D.*

AMID the therapeutic scepticism of this age a few remedies have retained their popularity that have come down to us from the fathers. Among the first of these we rank arsenic. Its range of application is perhaps more limited than it was, and the indications for its use are more closely defined, but it is still of high repute in the treatment of certain chronic skin-affections, diseases of the nervous system, and as an alterative and tonic. It is still considered of great value as an antiperiodic, though overshadowed by quinine, its more powerful and less dangerous rival.

In view of the known virtues of the drug, a certain and safe means of introducing considerable quantities into the system without disturbance of the digestive tract must certainly be regarded as a distinct advance in therapeutics.

The hypodermic use of Fowler's solution has been recommended by numerous writers. Among others, Hammond,† who claimed that the dose which could be administered in this way was much greater than could be safely administered by the mouth. He says, "I have frequently given as high as 35 drops of Fowler's solution as an initial dose. It is very certain

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† "Nervous Diseases."

that the stomach would not tolerate this quantity. Again, I have often carried the amount given by the mouth to the utmost bounds of prudence,—till the eyes were puffed and vomiting was almost incessant,—and then have continued the arsenic in larger doses, by hypodermic injections, with the result of the cessation of all gastric symptoms and the cure of the disorder."

Hammond certainly recommends larger doses than any author we have seen, with the exception of Eulenberg, who is quoted by Rosebach and Nothnagel,* as having given .15 (2¼ grains) to .2 (3 grains) of pure arsenious acid without untoward effects. We cannot, however, but regard this as a misprint or an error in translating.

Dr. Frühwald† treated twenty-two cases of chorea minor by this method. He says that redness of the skin at the site of the punctures was common, and two or three abscesses formed. The dose was from 5 to 20 drops, and after the use of thymol and deeper injections no further trouble was observed.

Grunnach‡ treated one hundred cases of goitre with hypodermic injections of Fowler's solution, 1 part to 4 of water.

Dumont§ treated twenty-six cases of goitre with injections of 10 minims of Fowler's solution. He notes that inflammatory adhesions at the site of the punctures are frequent.

Hammond‖ says that in the hypodermic use of Fowler's solution there is a decided tendency to the development of cellulitis and consequent abscess, as well as painful cutaneous inflammation. He recommends that a point should be chosen where the skin is loosely attached to the subjacent tissues. If the outer aspect of the arm near the insertion of the deltoid is selected, an abscess is the invariable sequence.

It will be seen that these writers speak of the irritating properties of Fowler's solution when injected beneath the skin. This has been attributed by some to a septic condition of the solution, and by others to the spirits of lavender used to color it. In a conversation with Dr. W. S. Haines, Professor of Chemistry in Rush Medical College, he suggested that, while septic matter might produce an abscess, and probably was frequently present if the solution was carelessly prepared, in the great majority of instances the irritating properties of Fowler's solution, when injected into cellular tissue, was due to the varying amounts of arsenious acid contained in the preparation. As ordinarily prepared and sold in the shops, all of the arsenious acid is not converted into arsenite of potassium, and so could not fail to be irritating. He further suggested the use of the arseniate of sodium, a stable salt, readily soluble, and of definite composition, and kindly prepared a one per cent. solution, and subsequently a five per cent. solution, that were used extensively in the clinic for nervous diseases.

Dr. Haines recommends that the pure anhydrous salt be used; as ordinarily found in the shops, it may contain from four to twelve molecules of water of crystallization. If this be driven off, by heating to 300°, the resulting salt has a definite composition. With the formula Na_2HAsO_4, a 1 to 100 solution of this salt contains 53 per centum of the arsenic found in Fowler's solution, so, approximately, the dose of such solution should be about twice that of the liquor potassii arseniatis.

The results with the use of this solution were excellent. In one hundred and twenty-seven injections, with a dose varying from 6 minims of a one per cent. solution to 15 minims of a five per cent., slight induration was produced six times; in one instance, with some induration, the skin was a little reddened and tender. In one case there was some ecchymosis, though this might have come from a little want of care in using the syringe. It may be stated that this induration was only slight; in no case did it call forth any complaint on the part of the patients, and in no instance was there anything approaching an abscess. That the slight irritation was not due to the salt was amply shown by the fact that the five per cent. solution caused no more irritation than the one per cent.; in fact, it was rather due to the quantity. When the syringe was filled (15 minims) with either strength some induration was caused, while a less quantity (5 to 10 minims) caused no change whatever.

The results of this treatment are shown by a few cases taken from records:

A. D., aged 14; female. Has had marked involuntary movements of all the extremities for the past four years. During that time she has never been wholly free from them, though there have been marked exacerbations each year. Puberty has been recently established. Diagnosis, chorea. She was im-

* "Materia Medica and Therapeutics."
† *Jahrbücher für Kinderheilkunde*, 1887.
‡ *Schmidt's Jahrbücher*, ccx. p. 195.
§ *Corr. Bl. für Sch. Aerzte.*
‖ Ibid., p. 745.

mediately placed upon arsenic hypodermically, beginning with 3 minims of the five per cent. solution, and increasing every second day, until three weeks after beginning the treatment, when she was receiving 13 minims of the solution at each injection, with an arsenic equivalent of about 36 minims of Fowler's solution. At the ninth injection she was discharged cured.

S. McC., aged 13; female; diagnosis, chorea. This was one of recent chorea due to fright, without rheumatic or heart complications.

July 5.—Treatment began by the administration of 7½ minims of Fowler's solution (by the mouth) thrice daily. On the 19th the patient reported that she was worse, and suffered from peculiar sighing respirations, that were very distressing. She was then given 10 minims of the one per cent. solution; on the 22d, 15 minims; and on the 24th, 30 minims. At this time the painful respiration had ceased, and the patient was greatly improved. The dose was increased rapidly until August 23,—about one month after commencing treatment,—when the patient was discharged cured. The last five injections in this case were equivalent to 30 minims of Fowler's solution.

H. H., a slight, anæmic girl; aged 15; presented herself in June with a history of chorea extending back into early spring. She was placed upon Fowler's solution by the mouth, but at the end of a month, there being no improvement, it was changed to hypodermic injections of the arseniate. She was discharged at the end of a month perfectly restored. 12 minims of the five per cent. solution was the highest dose recorded in this case.

G. H., chorea of five years' standing in a pale, anæmic girl of 13. The chorea had resisted all treatment, and the mother had had the child at various clinics, but without result. She was immediately placed upon 5 minims of the five per cent. solution, which was rapidly increased until in six weeks' time she had reached a dose of 15 minims, with an arsenic equivalent of about 42 minims of Fowler's solution. At the present time she is fully recovered, and has gained six pounds in weight.

In this connection we desire to especially emphasize the tonic action of this kind of medication, which, we think, is amply attested by the improvement in weight and color of all our cases. This we hope to demonstrate more conclusively in the not distant future by enumerating the blood-corpuscles and estimating the hæmoglobin.

The treatment has been employed thoroughly in two cases of paralysis agitans and in other forms of tremor, but without confirming the observations of Eulenberg as to its value in these conditions.

We cannot leave this part of our subject without calling attention to the case of a woman who presented herself at the clinic with enormous lymphadenoma of the side of the neck. After a few deep injections into the glandular mass, it began rapidly to diminish; when it had lessened one-half, the patient ceased attending, and further results could not be noted. This observation is thoroughly in accord with numerous writers, who have reported equally good results from the use of Fowler's solution in the various forms of glandular enlargement passing under the terms lymphoma, lymphadenoma, and Hodgkin's disease. We are satisfied that the local application of arsenic would have been greatly extended in these cases had it not been for the irritating properties of Fowler's solution and the almost certain abscess which it causes in this kind of tissue.

The value of hypodermic injections of Fowler's solution in malignant tumors of the skin has been affirmed by Monckton,* Pick,† and Lesser.‡ Can we not look for an increased range of application in these cases, with a salt free from irritant properties, and consequent inflammation and abscess?

Before closing this article we desire to say an additional word regarding the solutions employed. When first made they were invariably aseptic, perfectly limpid, and would remain so indefinitely if tightly corked. After they were frequently opened, a slight opalescence would develop, due probably to some microorganism. The solutions, however, remained free from pathogenic germs, as when injected not the slightest irritation was produced. We desire here to refer to the kindness of Messrs. Parke, Davis & Co., who have prepared for us hypodermic tablets, one containing one-tenth and the other one-twentieth grain of the salt. These have proved very convenient in private practice, though it will be apparent by a reference to our cases that the quantity in each tablet is much too small.

The action of arsenic given under the skin, if it have any virtue, must certainly be greater

* *British Medical Journal.*
† *Medical Record.*
‡ *Centralbl. f. die Med. Wissensch.*

than when taken by the stomach. Thrown into the cellular tissue, in the form of a feebly alkaline and readily soluble salt, it is at once absorbed by the blood and carried to all the tissues. Administered in this way, it at once reaches the skin and nervous tissues without running the gauntlet of the liver. As might be inferred, its action in these cases would resemble that of the salts of mercury when given by inunction or hypodermically. The liver seems to have a strong selective action for certain metallic salts, and among these arsenic must be accorded the first rank. As its toxic effects are largely focused upon the liver and adjacent abdominal organs, is it not rational, then, to suppose that, if given by the mouth, it would pass the liver with difficulty, and cause greater disturbance than if it were immediately distributed to all parts of the body by the general circulation?

THE PLACE OF MERCURY IN THERAPEUTICS.

By E. P. Hurd, M.D., Newburyport, Mass.

I.

When mercury was a new remedy,—somewhat more than three hundred and fifty years ago,—one of its first applications was to the treatment of syphilis, then a new disease, at least in Europe. Mercurial preparations had been long in use by the Moors for the cure of external parasitic diseases (itch, mange, favus, etc.), and naturally the "Neapolitan ointment" came to be used in the cutaneous affections of syphilis,—a disease which became very prevalent early in the sixteenth century. Matthiolus, finding "red precipitate" efficacious in the rashes and other outward manifestations of venereal diseases, empirically prescribed it internally in 1536, and the following year the pills of Barbarossa, whose principal ingredient was mercury, derived celebrity from having cured Francis I. of syphilis. Paracelsus and his followers did much to bring mercury into vogue as an antivenereal remedy. In 1667 corrosive sublimate was first used internally,* but at a much earlier date mercurial inunctions were in general use.

The preparation of *calomel* was long a secret, but the method of procuring it was made known in 1608. "Its name, which signifies *beautiful black*, was applied to it by Sir Theodore Mayerne in compliment to a negro who assisted him in preparing it" (Stillé).

Like all new remedies, mercury had its season of popularity and decadence, and the extravagant expectations which were first entertained of it were not realized. It was given so lavishly, and so utterly without care or judgment,—from ignorance of its constitutional effects, no experimentation on animals or careful clinical experimentation having been performed,—that in numberless instances the toxic effects manifested themselves in salivation, paralysis, tremors, a most deplorable cachexia, and sometimes in ulcerations and in diseases of the bones, which, in intensity and extent, matched or surpassed anything produced by the syphilitic poison. As a result, the reaction against the new treatment became strong, and physicians were divided into two powerful parties,—the mercurialists and anti-mercurialists. Both parties appealed to facts that were incontrovertible,—the one to the multitudinous instances of recovery from syphilis under the use of mercury, sometimes *cito, tuto, et jucunde;* the other to the essentially *poisonous* nature of mercurial preparations, to the risks attending their use, and the certainly deplorable results that follow their abuse.

The present century has witnessed, perhaps, the most vehement opposition which has ever been made to the mercurial treatment of syphilis. It was begun in France by Broussais, who denied the specificity of syphilis, and has been continued by Broussais's followers in France, by Murphy in England, by Joseph Hermann in Germany, by Lorinsir, Klitzinsky, Melsens, Anzias, Turenne, Sperino, Boeck, Wm. Ferguson, John Thompson, Boerensprung, Diday, Desprès, and others. The natural evolution of the disease has been studied, and it has been shown that a certain proportion of syphilitic cases get well without mercurial treatment, or even any kind of treatment.

And yet we believe that we are but voicing the opinion of the great majority of physicians in all countries, when we affirm the superiority of mercury to all other medicines in the treatment of syphilis. Army surgeons and hospital surgeons have again and again made the trial—treating syphilitic patients now with, now without mercury, and generally the verdict has been in favor of mercurial treatment, at least in the manifestations of

* Stillé, "Therapeutics and Materia Medica," article "Mercury."

secondary syphilis.* Of course, mercurialization, carried to the extent of full salivation and the production of the physiological (toxic) effects of the drug, is not now advocated by any good authorities on venereal disease.† The good effects of mercurial treatment in causing disappearance of the cutaneous manifestations of syphilis are especially noteworthy.

When we come to investigate the actions of mercury on the human organism in health and disease, we are met by discrepancy and contradiction. Given to the non-syphilitic person, mercury is said to diminish the plasticity of the blood and the number of globules. On the other hand, when administered to the syphilitic, mercury "plays the *rôle* of a tonic; it multiplies the globules, increases their vitality, regenerates them, increases the plastic qualities of the blood, provided that the dosage of the mercurial and the duration of its administration do not exceed certain limits."‡

This augmentation of the corpuscular richness of the blood of syphilitic patients under the influence of mercury has been noted by many competent observers. Thus, Wilbouchewitz, of Moscow, has studied the action of mercurial preparations on the blood by means of the hæmatimetric numeration of globules. He has always noticed that the number of red globules is greater in syphilitic persons during mercurial treatment than before. In animals under experimentation, the administration of mercury always occasions a diminution in the number of globules. Keyes, in this country, Robin, Schlesinger, and Martineau in Europe, have repeated these experimental investigations with similar results. Martineau has known the number of globules to go up under mercurial treatment from two to four and five millions, subcutaneous injections of mercuric ammoniacal peptones being used.§

How are we to explain this difference of action? Why does mercury, the most powerful producer of spanæmia known, cure syphilitic anæmia? We are still able to give no better answer to this question than that given by Wilbouchewitz,—viz., that syphilis produces corpuscular disintegration and diminution; and mercury, by antagonizing this action, causes the globules to increase. In other words, syphilis being a microbe-disease, mercury destroys the specific microbe. It is still a choice between two evils, for mercury none the less acts as a corpuscular poison when given in syphilis; only the syphilitic agent more rapidly and more intensely spoils the blood and prostrates the vital energies, and mercury does a greater good than evil by staying the ravages of the baneful microbe.‖

Doubtless one cause of the evil effects of mercury, when given as an antisyphilitic remedy in the past, is that it has been prescribed for cases where it was not indicated, —*i.e.*, for cases of soft chancre or for subjects not really syphilitic, and for cachectic subjects in the tertiary period. Liebermeister

* "At the commencement of my military medical life I was deeply imbued with the views of Guthrie, who was a violent anti-mercurialist, and I treated for two or three years all my cases of syphilis without an atom of this medicine. But I was not satisfied with the results. The manifestations of syphilis were more severe, and lasted longer than was to have been expected; and I, therefore, did what I trust you all will do when you discover that you have been holding erroneous views and doing wrong acts,—changed my practice, and I have never regretted it to this day" (Dr. W. A. Hammond, "Lectures on Venereal Diseases," Philadelphia, 1864).

† Trousseau was almost the last advocate of the Boerhaave *drenching* method of administering mercury in syphilis" (see his "Treatise on Therapeutics," Am. ed., vol. i. p. 116).

‡ Jules Simon, "Conférences sur les Maladies des Enfants," tome i. p. 204.

§ Dujardin-Beaumetz, "Dictionnaire de Thérapeutique," article "Mercure."

‖ The question of the form in which mercurials exist after their introduction into the body is not yet settled,—*i.e.*, whether mercury acts chiefly as such, or whether the various compounds of mercury act by virtue of their individuality. Doubtless, as Bronson says, the pharmacodynamic form of mercury is one of the metal in intimate union with albumen. The antidotal theory—ably expounded by Beale—is as old as John Hunter. Another theory, well stated by Bronson, is this: The chief characteristic of syphilis is a tendency to hyperplastic cell-growth. The effect of mercury is to check this hyperplasia. It does this by imparting to the cells some quality which restrains their morbid activity, and predisposes them to retrograde metamorphosis. It does not act by restraining waste, by denutrition, but by retarded growth; nor does it aid repair. (*Med. Record*, vol. xx. p. 510.

This writer treats the doctrine that mercury acts in syphilis as *a general reconstituent tonic*, with a guarded scepticism. The facts, however, as observed by Keyes, Wilbouchewitz, and others are none the less incontestible. The action of mercury upon the syphlitic virus cannot be a simple chemical neutralization, for were that the case, the largest possible quantity of the drug that could be absorbed in the shortest possible time would act the most certainly, whereas we find that the opposite is the case, and that when from large doses of mercury salivation occurs, new localizations of the disease take place (Bäumler).

adds another contraindication : the mercurial should not be given too early in the evolution of the secondary accidents.* According to this authority, mercury should be given late rather than early ; never from the time of the first appearance of the induration. Doubtless, he says, the induration disappears more rapidly under the influence of the mercury, and the secondary manifestations are retarded ; on the other hand, when the latter do appear, "they are more intense and more rebellious to the specific treatment than when the primary sore was only subjected to local treatment."

It is hardly necessary to say that medical authorities are not at all unanimous as to the time when to begin the specific treatment. The Vienna school (Hebra, Zeissl, Sigmund), with Liebermeister, would wait for the full development of the secondary accidents ; while the Paris school, lead by Fournier, and eminent German authorities (Kaposi, Neisser, Leube, Edlefsen, Bäumler, Weber), affirm the superiority of early treatment, which should be begun as soon as the infecting chancre is diagnosticated.

We are of opinion that in this country and in England as many good authorities could be mustered on one side as on the other of this question, so that we shall not attempt to decide it ; in fact, only the most careful clinical experimentation—separate series of cases being treated according to the teachings of the two parties—can warrant a decision as to whether the mercurial treatment of secondary syphilis should be begun early or deferred to a comparatively late period. Only, it is proper to advise that the practitioner should never treat a suspicious induration as a specific, infecting lesion, *till he is sure that it is such.*

Mistakes in diagnosis are easy, and it is a serious matter to put a patient under mercurial treatment who has not syphilis and is really in no danger of having this disease. This mistake has been made again and again, and is the opprobrium of a practitioner. Again, it may be that in some cases of infecting chancre, the virus early undergoes development in the system, and therefore early mercurialization is demanded ; in other cases, the incubation period is prolonged, and mercury, if given before it meets the poison in the blood, may do more harm than good.

It seems certain, from all the data we possess, that mercury, to have a "tonic and reconstituent effect" in syphilis, must be given when syphilis exists ; and it is safe to advise the young practitioner, who sees comparatively few cases of syphilis, never to attempt to treat this disease *till he is sure that the case before him is one of syphilis.*

It is not pretended that mercury can be given in syphilis to the extent demanded, *with absolute impunity ;* all that can be said is that it is better to give it than not to give it. But what anti-venereal medication can be said to be absolutely harmless ?

As for the preparations and doses, we shall not attempt to decide the question whether full doses, given daily within a brief period, so as rapidly—within a month or two—to bring the system under the influence of the drug, the mercurial to be then stopped ; or whether small doses, whose administration is prolonged weeks, months, and years, constitute the safest and most effectual method. We content ourselves with stating the methods. Sometimes, doubtless, the rapid method is safest ; sometimes, on the contrary, it would be highly detrimental.

At the Tübingen clinic, the mercurial employed is calomel, in large doses. Liebermeister begins by giving 10 centigrammes (1⅔ grains) of calomel night and morning. The dose is gradually raised to 50 centigrammes (8⅓ grains) night and morning, and this remains the maximum dose to the end of the treatment. The mouth is frequently rinsed with chlorate of potash solution to prevent salivation, which is not considered a desideratum. There is seldom diarrhœa to give trouble. The mercurial treatment is continued about forty days. The Tübingen formula is as follows : For five days, morning and evening, 10 centigrammes. The five following days, 20 centigrammes. The next five days, 40 centigrammes ; the next five, 50 centigrammes ; this maximum dosage is kept up twenty days longer. In patients the subjects of anæmia and debility the doses are smaller and the duration of the treatment much longer.

Liebermeister affirms that his experience has shown that an energetic medication of this kind, applied during a brief period, does much less harm than a treatment less active, but continued much longer. He admits, however, that this method is better adapted to hospitals, where the patient is continually under observation.

Dujardin-Beaumetz prefers the method by

* "Lessons on Infectious Diseases," article "Syphilis." Tübingen, 1885.

mouth to inunctions, the mercurial fumigations or baths, or to hypodermic injections of mercuric ammoniacal peptones. The bichloride or biniodide are the salts of his choice.

Van Swieten's solution of bichloride, which is a 1 to 1000 solution, may be given in teaspoonful doses three times a day, or from two to three a day of the protiodide pills (1/5 grain) may be given, or the same number of Gibert's pills of the biniodide. Physicians in this country who believe much in a mixed treatment are prone to adopt a medication which is more or less a modification of that recommended by Hammond in his "Lectures on Venereal Diseases." A solution of corrosive sublimate with potassium iodide is given till the system is well under its influence. A convenient formula is as follows:

℞ Potass. iodidi, ʒi;
Hyd. bichlorid., gr. vi;
Aquæ, ℥xii.
Dose.—A teaspoonful three times a day.

As a rule, the patient is kept under the mild influence of this medicine for at least five months. Instead of this preparation, a grain and a half of the protiodide, in divided doses, may be given daily during the same length of time. Under this treatment the gums are seldom touched, and mercurial cachexia is for the most part avoided.

In his standard treatise on venereal diseases,* Keyes advises what he calls the tonic treatment of syphilis by mercury. He would never begin treatment till the first general symptoms of syphilis appear; would use the same drug continuously in varying doses. He prefers the protiodide, using Garnier's (French) granules, each of which contains 1 centigramme (1/6 grain). To bring a patient under the tonic treatment the following course is advised: Let him take 1 granule of the protiodide after each meal for two or three days. On the fourth day, one extra standard dose is added at the mid-day meal; now four granules are taken daily, and this is continued for three days. On the succeeding fourth day, another standard dose is added, the five daily standard doses being taken, two in the morning, one at noon, and two at night. On the next following fourth day, always counting from the last fourth day, another dose is added, two standard doses being now taken after each meal,—six granules a day. The doses in some cases are increased to nine and even twelve granules a day, when griping and diarrhœa set in, occasionally also the gums become touched; the limit is now reached. When the patient is taking twelve granules a day, he is taking his "full dose," which is only to be used in cases of necessity; ordinarily one-half of the full dose is the "tonic dose," and may be continued steadily for several years without injury to the patient. Of late, Keyes contents himself in most cases with "one-third," instead of "one-half," the "full dose." This dose is also "tonic," and is continued daily, year in and year out, for, in round numbers, about three years.

This mode of treatment is, in the main, endorsed by Greenough in the *Boston Medical and Surgical Journal*, August 17, 1882. Most patients, he says, will do very well on 1/3 grain doses of the protiodide *ter die;* the bichloride, 1/8-grain *ter die*, is sometimes borne where the protiodide is not.

Bäumler says that the rule should be to select the mercurial preparation which can be continued for the greatest length of time without causing derangement of the digestive organs. In accordance with this rule, he would give the preference to blue pill, or *hydrargyrum cum creta*, over calomel ("Ziemssen's Cyclop.," vol. iii. p. 290).

To speak from my own experience, I would say that country physicians, as a rule, prefer the "mixed treatment," believing that the combination of mercury with iodide of potassium is admirably adapted to secondary syphilis, and that *much less mercury* is needed when the mercurial is given along with iodide of potassium.

Greenough thinks that mercury is the mainstay in all stages of syphilis. The general consent of authorities, the world over, would, however, limit its usefulness to the secondary manifestations; in tertiary syphilis the principal reliance must be placed on iodide of potassium.

To conclude this part of our subject, it cannot be too strongly urged that mercury acts as a tonic and reconstituent in syphilis only by antagonizing the syphilitic virus and checking a greater evil, and that the smaller the doses that produce this result, the better (as a rule) for the patient.†

In another article we shall consider other uses of mercury in therapeutics.

* Keyes, "Venereal Diseases," 1880.

† See some excellent remarks by Dr. E. B. Bronson, "On the Action of Mercury in Syphilis" (*Medical Record*, vol. xx. p. 510).

HOW TO PREVENT HAY-FEVER.

By Alexander Rixa, M.D., New York.

In the May (1890) number of the Therapeutic Gazette I furnished some contribution to the "Treatment of Hay-Fever." I reported therein a favorable result in the treatment of this mysterious disease in the experience of my last year's cases.

My experience of this year is far more gratifying, and worthy of receiving a wide publicity.

I treated six cases in all, four of which have been habitual for years to hay fever proper without complications, while the other two used to have the disease aggravated with reflex asthma and bronchial catarrh.

I succeeded in preventing the outbreak of the disease in every individual case. The treatment I applied was very simple, and consisted of the following:

From the fact that I had known all my patients from previous years, I ordered them to my office two weeks before the usual onset of the disease. I advised them to irrigate the nose with a warm solution of chloride of sodium four times a day,—morning, noon, evening, and on retiring; and, a few minutes after the cleansing of the parts, had the nares thoroughly sprayed with peroxide of hydrogen and c. p. glycerin, half and half. Those subject to a conjunctivitis I prescribed a two per cent. solution of boric acid as a wash. At this period no internal medication was given, but three days previous to the usual onset of the disease I prescribed phenacetin and salol, five grains of each three times a day.

On the respective expected days, to the great surprise of all the members concerned successively, who have been in the habit of getting the disease almost invariably at a certain date, no hay-fever symptoms appeared, though every one had been the victim of the disease for a great number of years, varying from five to nineteen years' standing.

It is self-understood that this treatment was kept up all through the season, and, as no symptoms developed, the applications were reduced, towards the termination, to twice and once a day. The internal medication, however, was stopped after the expiration of the first week, and all the patients could attend to their various respective vocations, something they never have been able to do in previous years.

In two cases, though no nasal symptoms developed, about two weeks after the calculated onset, slight symptoms of asthma made their appearance. However, I could easily suppress them at this time with the aid of the hand atomizer and ozonizer, a very ingenious little apparatus, of which I gave a thorough description in my last year's article. I used the ozone inhalations every four hours, in connection with the internal administration of the following prescription:

℞ Iodide of ammonia, 8;
Fl. ex. quebracho, 30;
Fl. ex. grindelia robusta, 15;
Tr. lobelia, 12;
Tr. belladonna, 8;
Syr. pruni. virg., q.s., ad 120.

Sig.—Teaspoonful three or more times during twenty-four hours.

However, towards the end of the fourth week, especially in one case,—a stout, heavy-set gentleman,—very grave asthmatic symptoms developed, which compelled me to apply Chapman's spinal ice-bag, as well as resort to the internal administration of large doses of codeine during the paroxysm, with the most beneficial result.

I gave also oxygen inhalations a fair trial in the two cases. I find them to act very soothingly in the simple asthma, facilitating respiration after a few minutes; but during the paroxysmal stage they cannot be utilized, for the reason that respiration is short and rapid, and does not permit of a control in the quantity of the gas to be inhaled. Consequently, it is either of little use as a remedy; or, if too much is taken, a disagreeable headache will be the consequence.

During the catarrhal stage, which, however, was very mild compared with last year, I derived great benefit from the administration of codeine, in combination with terpine hydrate, in the pill form. The codeine has the advantage over all other opium preparations that it does not affect the digestive organs, and still acts in a soothing manner. While during last year's sickness my patients lost from ten to twenty pounds of their bodily weight, this year but one lost eight pounds and the other five pounds.

As the etiology of this troublesome disease is yet enveloped in obscurity, we may fairly conclude, by the success of my treatment, if it should meet with the confirmation of the profession, that the much pretended sensitive area, situated, according to Dr. Sajous, "at the posterior end of the inferior turbinated bones and the corresponding portion of the septum;" or, according to Dr. John Macken-

zie, who locates this area "at the anterior extremity of the inferior turbinated bone," need not necessarily be removed, or destroyed by cautery, in order to accomplish a cure of hay-fever proper.

I examined my patients twice a week, and the closest rhinoscopical exploration would not reveal the slightest pathological change in the mucous membrane of the nares.

Now, what is the etiological factor of the disease? Is it a specific germ conveyed by the air to the parts and—*locus minoris resistencia*—deposited at the pretended area, or is the germinal matter present in the nasal mucous membrane with certain persons, and requires only at a certain time and under certain conditions physiological stimulation to manifest periodical pathological changes, which give rise to the train of symptoms called hay-fever? Dropping all hypothetical reasoning, I think some outside vegetable germ is causing the disease in those predisposed, and peroxide of hydrogen acts on them as it does on the pus corpuscles,—*i.e.*, drives them out when and wherever it finds them. I hope the profession will give this new measure a thorough trial and report their results.

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ARSENITE OF COPPER.

By W. H. Bentley, M.D., LL.D., Woodstock, Ky.

HAVING read with interest the paper in the Therapeutic Gazette, by Dr. John Aulde, on the "Uses of Arsenite of Copper," in the June number of the present year (1890), I obtained from Messrs. Parke, Davis & Co. a sample of their tablets of arsenite of copper.

As the cases referred to by Dr. Aulde, treated by the arsenite of copper, appeared to have been acute, or, at least, recent cases of diarrhœa, and as my numerous cases of this affection recently treated had yielded very readily, and those under treatment appeared to be yielding rapidly to my usual treatment, I reserved the specimen tablets for a *possibly* more obstinate case, as I considered it hazardous and unwise to abandon a course of treatment that had proven safe and efficient in my hands for quite a number of years, simply to experiment with a new and by me an untried drug. In due time the following case presented:

Case I.—Little Emma J., aged 16 months, from May 1 had been occasionally suffering from acute diarrhœa, accompanied by high fever. These attacks readily yielded to my treatment, and entirely subsided on the appearance of the irritating teeth. July 20, when the superior canines, commonly called "the eye-teeth," were about to appear, she had by far the most serious attack, being thrown into spasmodic paroxysms. By the use of the gum-lancet the teeth were brought through, and under other treatment she was speedily relieved. Her fever and vomiting were at once allayed, but the diarrhœa continued to be quite troublesome. She had frequent motions through the day and more frequent ones through the night; in fact, rest and sleep at night were nearly impossible. The discharges, as shown by test-paper, were neutral; there was no febrile action perceptible; tongue, pulse, and temperature normal. The dejections were thin, but not watery; in color, rather light. The diarrhœa, in short, seemed to depend upon a passive condition of the system. After three days spent in fruitless attempts to control this state of things, I resorted to the *arsenite of copper*. I dissolved one tablet, one-hundredth grain, in sixteen teaspoonfuls of water, and ordered a teaspoonful every fifteen minutes. At the end of the four hours the patient was perceptibly better. Then a tablet was dissolved in ten teaspoonfuls of water, and a teaspoonful given every hour. By this time the bowels were controlled. Another tablet was dissolved in ten teaspoonfuls of water, and a teaspoonful given every two hours. Of this last the patient took but half, as she was then lively and well.

Case II.—My second case was that of a widowed lady, 69 years old, tall, spare, black eyes, and, even at so advanced age, raven-black hair. I had known the old lady for twenty-five years. During the five years that she resided near me I had treated her once for remittent fever. With that exception she had, for one of her age, enjoyed reasonable health, until January, 1890. Then she caught a cold, coughed considerably, and was generally indisposed, but not confined to bed. She had a "scape-justice" of a neighbor, who was peddling a nostrum labelled "Native Herbs." This consisted of some kind of contused leaves. One package was to be infused in a quart of boiling-water, and when cold, taken in 2-ounce doses every four hours. In Mrs. M.'s case it proved a violent emetic and cathartic. Nor was this all. The irrita

of the stomach and bowels was so great that both the emesis and diarrhœa became chronic, and so remained to the date of my first visit. August 25 I was informed by the nurse that within the last twenty-four hours the patient had vomited fifteen times and there had been twenty-four dejections. During the last three or four weeks prior to my visit she had been made the treatment of a young, ignorant quack, with a bought diploma, which he could not read. On a small table stood a pint flask half-full of a dark, nauseous fluid, of which the dose was a tablespoonful, repeated every four hours. From its taste I could not recognize anything with which I was acquainted. It was evidently a decoction of some weed, perhaps a plant that had never been used by any other mortal. Besides, there was a large bottle of whiskey. Of this she got a tablespoonful every time immediately after vomiting. And this I was told had been his course of treatment throughout. At this time the patient was greatly emaciated and so extremely weak that she could not, without assistance, rise from her pillow or turn in bed. Her protracted vomiting had for a long while nearly deprived her of the benefit of food. The incessant diarrhœa, too, contributed in no small degree to her enfeebled condition. On examination I found the temperature normal; the radial pulse so feeble as to be scarcely perceptible, beating at 80; tongue clean and pale, much elongated and pointed, the edges of a dusky red; lips pale; some œdema of the feet and ankles. I dissolved one tablet of the arsenite of copper in five teaspoonfuls of water, and ordered a teaspoonful every thirty minutes. One hour and fifteen minutes after first dose she vomited and passed a small watery stool. Two hours later passed another small watery stool. At the end of five hours I prepared another tablet with five teaspoonfuls of water, directing a teaspoonful every hour. I then returned to bed. She had no vomiting and no movement of the bowels during the ensuing seven hours from the last mentioned. She then ate some squirrel soup and drank a little coffee, but without relish. Immediately after the meal she had 5 grains of lactated pepsin, the same in like doses to follow each ensuing meal. Another tablet was used in five teaspoonfuls of water, and an hour after the pepsin a teaspoonful was administered, with orders to give it every two hours. I left some tablets, with orders to dissolve each, when required, in five teaspoonfuls of water, and give the doses three hours apart. I then left for home, returning three days after. The nurse reported but one vomiting, and that soon after my departure, and four stools on that day, and three on each subsequent day, and these growing gradually more natural. At my second visit I found my patient improved in every respect. Temperature normal; tongue nearly so; some appetite. I continued the treatment, except the arsenite was given every four hours, and I ordered one 3-grain Bland's pill before each meal. Three days later I visited the case. Patient sitting on a chair by a small wood-fire. No vomiting or diarrhœa during my absence. Appetite keen and digestion good. Still some œdema remained in the feet. Left off the arsenite, and continued the pepsin and pills for a week longer. Patient's son reported œdema entirely gone and his mother well, except weakness.

From the above cases, and especially the last, it seems that arsenite of copper offers a hope even in inveterate cases of chronic diarrhœa. I admit that these two cases do not warrant a reliance on arsenite of copper in chronic diarrhœa. Still, I think, they are of sufficient significance to warrant their publication at some length of detail.

THE PHYSIOLOGICAL ACTION OF CARBOTHIALDINE.

Carbothialdine was first obtained in 1840 in the form of crystalline scales, somewhat resembling those of uric acid. It is insoluble in hot water and cold ether, slightly soluble in alcohol at the ordinary temperature, and decomposes in boiling water. DR. MAZZETTI has undertaken a series of experiments with carbothialdine, and his results are published in *Les Nouveaux Remèdes* for November 8, 1890. As it is insoluble in water, the author employed an emulsion in gum-arabic, which he injected into the subcutaneous tissue of the rabbit or the dorsal lymphatic cells of the frog, the dose being $\frac{1}{12}$ of $\frac{1}{6}$ grain. Some time after the injection the frogs showed evidence of increased excitability of the spinal cord, manifested by an exaggeration of reflexes, gradually progressing towards complete tetanus, death occurring from arrest of the heart in diastole. The excised heart was also arrested in diastole when supplied with serum containing carbothialdine. Muscular excitability, both direct and indirect, persisted some time after death. It seems, however, that this substance had no effect whatever on rabbits.

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Leading Articles.

COUNTER-IRRITANTS.

DOUBTLESS the therapeutic method known as counter-irritation is less employed to-day than formerly. If we except the occasional application of a sinapism or other mild rubefacient, many physicians seldom or never resort either to derivation or revulsion, at least in the treatment of ordinary acute diseases, and some have abjured this mode of treatment altogether. If we refer, for instance, to the treatment of pulmonary and cerebral inflammations, every physician who has been fifty years in practice recognizes the fact that, coincident with marked changes in fashion respecting the employment of bleeding and mercurials, much less importance is placed on the *fly-blister* to-day than was the case a few decades ago. It was formerly the current practice in pneumonia, about the end of the first week, "to push the mercurial treatment until the gums became somewhat affected" (Dr. Geo. B. Wood's "Practice," 1858), at the same time "to apply a large blister (8 by 10) to the chest." Dr. Wood, long a standard authority, directs (in accordance with popular usage) that this blister should not be put on before the fifth day, "as without unseating the inflammation (?) it might injuriously aggravate the fever." In acute cerebral inflammations the patient was to be at the proper time mercurialized, then over the shaved head tartar emetic ointment was to be rubbed, or a fly-blister applied. The physician of fifty years' experience, to whom we have alluded, would freely admit that if in the practice of himself and his contemporaries the blister has not altogether passed out of use, it is resorted to *exceptionally* rather than as a routine custom.

We cannot forbear noting in this connection that, in a recent profound treatise on "Diseases of the Lungs" (Germain Sée, Paris and New York, 1885), no mention is made of counter-irritation in the treatment of pneumonia, though nearly a hundred pages are devoted to the therapeutics of that disease. A similar remark may be made in reference to Jurgensen's standard treatise in "Ziemssen's Cyclopædia."

Doubtless the causes which have led to the neglect of vesicatories and other means of counter-irritation in acute inflammations have been manifold. Careful observers, as Rasori, Laënnec, Andral, Rostan, Louis, Fonssagrives, have pretended that they are "useless," even "injurious," augmenting the fever and the suffering. Moreover, the doctrine of the self-limited nature of all frank inflammatory diseases has been forcing itself on the attention of the medical profession. It was found, by a comparison of cases, that patients recovered in due time without the traditional blister, and it was claimed that convalescence was just as speedy and satisfactory where vesication was omitted. In the view of those who advocate the free use of stimulants in pneumonia, blistering is nonsense, being one of those means which detract somewhat from the vital well-being and comfort of the patient, the main thing being to support the strength, and especially the struggling heart, of the patient. The adoption by very many practitioners of the microbe doctrine has resulted in discredit of the blister. What can revulsion do against the microbes? With regard to cerebral inflammations, the very incurability of these affections, in the great majority of cases, has led most practitioners to be very chary of harsh measures in which they can have but an infinitesimal modicum of faith.

It must, however, be admitted that some of the truly successful leaders of the medi

of to-day are calling for a halt in this neglect of the revulsive method. Thus, Michel Peter, in a "conference" delivered in Hôpital Necker, December, 1890, on what he terms the "contrafluxionary medication," lifts up his voice in advocacy "of a superannuated medication, rejected by many in France, completely abandoned in Germany,—*i.e.*, the revulsive method." Certainly, he says, the rubefacient or epispastic provokes a fluxion to the part irritated, which really *does* cause "derivation" of blood from the seat of lesion; this is, doubtless, a reflex act, due to a modification of the vaso-motors. This derivation is sometimes considerable, causing a beneficial depletion of the inflamed organ. He insists that his experience has again and again demonstrated the utility of counter-irritation in acute inflammations. In pneumonia the *violence* of the inflammation may be moderated by a vesicant applied at the proper time and over the inflamed region; in acute nephritis, he would rely much on leeches or cups as the best means of "decongesting" the engorged kidneys.

Advocates of revulsion in acute disease make much account of such facts as the disappearance of an eczema on the development of a pneumonia (Dujardin-Beaumetz) of a severe broncho-pneumonia on the supervention of an attack of erysipelas (Peter).

The late Thomas King Chambers, author of "The Renewal of Life," a practical treatise of clinical medicine of twenty years ago, used to treat pneumonia and pleurisy with first leeches and then poultices to the inflamed side, then by a series of blisters. His famous "jacket poultice," he believed, "raised and restored the failing functions of the tissues." The blister was supposed to act, not by derivation, as Peter believes, nor by promoting through reflex action absorption of the exudation, thus being "resolvent," as Gubler and Dujardin-Beaumetz, but "by starting a healing process on the outside skin, which shall extend to the neighboring viscus inside."

Of course, all these theories of the influence of a blister on an inflamed lung and on an exudation are still largely matters of speculation. The practical question for every physician to decide is whether the severer modes of counter-irritation do enough good to more than counterbalance the suffering and other inconveniences which are known to spring from them, and especially whether, in doubtful cases, they may save life. Experience, rather than fine-spun theories, must still decide the matter.

THE PROPHYLAXIS OF VENEREAL DISEASE.

NEVER in this world's history has the importance of prophylaxis, in its reference to all contagious diseases, been more strongly urged than to-day. The ravages of small-pox have been largely stayed by vaccination; puerperal epidemics are becoming a rarity; the spread of measles, scarlet fever, diphtheria, is largely kept under control in cities and villages where the boards of health are efficient. Much good work is being done, and more is expected in the future, to prevent the extension of tuberculosis. But what shall be said of that other great scourge of mankind, —syphilis? It is not necessary that we should institute comparisons between this and other diseases likewise of a contagious nature. Certainly it can be shown that syphilis is second to none in its wide geographical distribution and in its baneful effects. What can an enlightened hygiene and humanitarian science do to prevent the spread of syphilis?

If it were in the power of governments to isolate (and, if need be, incarcerate) all the syphilitic, and prevent the communication of the disease by them, just as they can now actually isolate lepers, the problem would easily be solved. But the utter impossibility of this is obvious. The policy of this country—like that of Great Britain in former years, with the exception of a very few cities—has been one of *laissez-faire* and indifference. This policy is undoubtedly in accordance with our ideas of personal liberty, and the widely-prevalent conviction that the suppression of syphilis, like intemperance, can only be brought about by suppression of the vice which occasions it; and that the prevention of prostitution must be accomplished by social, moral, religious, and sanitary, rather than by legislative agencies. Consequently, no check is placed on the spread of venereal disease, and he who visits brothels must feel that he does so at his own risk, that every harlot is possibly, if not probably, contaminated, and that "her house is the way to hell, going down to the chambers of death." Indeed, by many philanthropists, the foreseen consequences of illicit sexual indulgence are regarded as the best possible deterrent; and, in the language of Mr. Solly, at the Royal Medico-Chirurgical Society, "Syphilis, instead of being considered an evil, should be considered as a blessing," being inflicted by the Almighty to act as a restraint upon the indulgence of evil passions.

It is needless to say that such interpretations of the Divine will do not generally prevail, that the policy of *laisses-faire* is doing nothing to effectually stay the ravages of syphilis, and that "a new-born sense of duty" already inspires our sanitarians and philanthropists.

With regard to methods of prophylaxis available and practicable, the means at command of society are limited. The policy of repression, long tried on the continent of Europe, in the cities of Berlin and Stockholm, and, till within a few years, within the states of the Church of Rome, has been a failure. Severe laws restraining prostitution were promulgated under many of the later Christian Roman emperors; a rigorous system of prohibition was re-enacted in 1560 by the edict of Orleans, and all places of public prostitution throughout France were suppressed. Instead of these, secret establishments of prostitution were formed, "far more pernicious than those which had been destroyed;" "vice left the brothel in order to glide stealthily into families, corruption threatened to seize on all and become general," and the policy of repression, instead of checking the spread of syphilis, powerfully promoted it. The history of governmental attempts to suppress prostitution in Spain is almost a repetition of what is said about France. For a period of nearly two hundred years, the ruling powers, at the beck of the clergy, endeavored to crush out prostitution in Spain; the result was the promotion of clandestine prostitution, the general degradation of woman, and the extension of syphilis in its gravest and most virulent forms.* So complete has been the failure of every attempt to root out prostitution by force, that it is doubtful if any government will ever again attempt repressive measures.

If syphilis cannot be extirpated by a cruel and repressive policy, whose aim is to stamp out prostitution itself, what shall we say of a governmental regulative *régime* whose intent is to exclude the diseased prostitute from the practice of her nefarious profession? If all prostitutes could be under police surveillance, and compelled to undergo regular medical examinations, at stated periods not too far apart, the diseased being at once sent off to hospitals and kept there till cured, it would seem as though a great check would be made on the spread of syphilis. This is what is attempted by regulations now enforced on the continent of Europe and in some parts of the United Kingdom. Houses of prostitution are watched over by a corps of police, who also aim to compel all women practising prostitution clandestinely to register and submit themselves to sanitary regulations. A medical staff is organized, whose office is to examine all registered prostitutes, to give a "bill of health" to all such as are found not diseased, and to send to some venereal hospital all that are found to be infected. These at first thought might appear to be very important measures of prophylaxis; the diseased are prevented from pursuing their calling, and are provided with the means of cure.

If all that practise prostitution could be isolated within certain wards or streets of cities, a policy which was attempted, though unsuccessfully, under the severe *régime* of Johanna I., of Naples, and of numerous other European sovereigns for several centuries; if, moreover, all harlots could be under constant police and sanitary supervision, there might be some hope ultimately, not merely of diminishing, but even of stamping out, venereal disease. Unfortunately, there can be no such governmental control of the social evil. The opponents of the prohibition of the sale of ardent spirits affirm that prohibition drives the traffic into dens and dark places; that "club-houses" and kitchen bar-rooms, more demoralizing than the saloon, come everywhere into existence, successfully defying the police, and fostering and perpetuating intemperance in its worst forms. Similar declarations have been made respecting the governmental recognition and regulation of brothels. A *Review* writer, in summing up the results of his studies (*Westminster Review*, No. clxxxiii. art. v.), affirms that "on every occasion when the experiment has been tried, prostitution *as a whole* has assumed larger and more formidable proportions, and venereal diseases, though greatly lessened among women subject to sanitary surveillance, are so enormously increased among the clandestine prostitutes, that the total number of those diseases is actually not only quite as great, but probably *very* much greater than before, . . . and there can be but one conclusion,—viz., that, as a means of lessening the amount of the diseases associated with the practice of prostitution, the system of legal recognition, toleration, and regulation always has

* See the testimony of Parent-Duchatelet and others in *Westminster Review*, No. clxxxiii. art. v.

proved and always must prove a complete failure."

The matter is treated from another standpoint by a writer in the *Journal de Médecine de Paris*, November 23, 1890. The regulation of prostitution, he says, which might have been in harmony with the state of science at the commencement of this century is in formal and absolute contradiction with the actual data of modern medicine. The venereal diseases are three in number,—blennorrhagia, soft chancre, and syphilis. The two first are essentially local; their duration is relatively short, and they can have but an indirect influence on the organism. It is not against *them* that the system of regulation is directed, but to prevent the propagation of syphilis. Now, if we adopt the usual classification of syphilis,—the stage of local lesion (hard chancre), the secondary and tertiary stages,—it is apparent, from all the data of exact observation and experience, *that the period in which syphilis can be communicated by contagion extends far beyond the period of chancre.* In fact, all through the secondary period (it is admitted that the tertiary period is exempt from the dangers of contagion) the syphilitic patient may give the disease, and not merely in the *active* phases,—where there are manifestations on the part of the cutaneous or mucous surfaces,—but even in the *latent* phases, when there are no external signs of the disease whatever. Of course, the primary ulcer is most contagious, but the instances are sufficiently numerous where, during the active manifestations of the secondary stage, syphilis is transmitted, as by wet-nurses to infants and *vice versa;* from man to woman, etc., by sexual relations; and even in the *latent* phases there is no guarantee against contagion, especially if the second party presents any abrasion or other solution of continuity on her person. Hence the only safety is in compelling the syphilitic patient to abstain from all sexual relations during the entire secondary period,—a period of several years' duration. It is evident that this necessity has not been contemplated by any system of governmental prophylaxis actually in operation.

These and other objections are urged with much force. From this point of view, the woman who is regularly examined and given a clean bill of health may be syphilitic nevertheless, and be a centre of contagion, even though there be not the smallest anatomical lesion about the genitals or elsewhere apparent to the naked eye.

Stoukowenkoff, professor of syphilography in the University of Kieff, confirms this view, also Schperk, of St. Petersburg. According to the latter, every woman who enters upon a course of registered prostitution in St. Petersburg, especially if she belong to one of the tolerated houses, becomes inevitably syphilitic within a variable time, which may be very short, but which never exceeds three years of sojourn in the establishment. Mœller believes that it is the same in Brussels, Paris, and other of the large cities that have governmental regulation. In fact, he says, in the nature of things it cannot be otherwise, for the dweller in the licensed establishment has little or no choice of "clients," and has no means of knowing whether her clients are syphilitic or not, for governmental supervision does not extend to the *male* party. Therefore it is hard to understand how any registered prostitute can long escape syphilitic contamination.

With regard to the working of the Regulation Act in certain cities in this country (as St. Louis), we hear conflicting accounts, one party strenuously maintaining that supervision is a failure, the other, that the system has, on the whole, worked well.

The only other method of prophylaxis to which we have time to allude is that which is expressed by the word *hospitalization.*

Liebermeister affirms—and here he has the support of the *Westminster Review* writer—that "the best means actually in existence for limiting the extension of syphilis is to facilitate the admission of venereal patients to the hospitals." At the Tübingen hospital, over which Liebermeister presides, syphilitic patients are received on the same footing as other patients, and, unless their condition is too repugnant, or unless there are peculiar circumstances which render their isolation necessary, they are treated in the general wards,—*i.e.*, along with patients suffering from cutaneous or other similar diseases. In other general hospitals in various parts of the civilized world there are special wards reserved for the syphilitic; in others, they are not admitted at all. Writers, as those above mentioned, have urged that there should be in every city not only *special* hospitals for venereal patients (like Loucine and Midi in Paris, where only *registered* prostitutes are admitted), but that the *general* hospitals should everywhere be more liberally opened to this class of patients. It is true that clandestine prostitutes, when suffering from syphilis, can seldom be induced to go to the special hospitals, on account of the stigma

which would be attached to them in consequence, while they would gladly enter the general hospital for humane treatment and restoration.

This may seem to be a small result of our inquiries as to methods of prophylaxis practicable, but we must remember that much more can be done than is really now being done to bring about the restoration of those that are not hopelessly diseased, and thus stay the spread of the scourge, and there will probably be no lack in the future of well-directed and systematic humanitarian efforts "to raise the fallen," and to teach communities—and especially the youth—the principles of sexual hygiene.

THE PHYSIOLOGICAL ACTION OF THE CONSTITUENTS OF THE ARTIFICIAL SALICYLIC ACID OF COMMERCE.

THE identification of the constituents of artificial salicylic acid have served as a basis for an elaborate series of investigations made by Professor Dunstan and Mr. O. F. C. Bloch, while their physiological action has been investigated by Dr. M. Charteris, the Professor of Therapeutics and Materia Medica in the University of Glasgow. Their results are published in the *Pharmaceutical Journal and Transactions* for November 22, 1890.

The value of these studies will be recognized when it is remembered that in 1886 it was discovered that the administration of the artificial product from carbolic acid, however much it may have been dialyzed and purified, rapidly produced results resembling delirium tremens; and since then many reports of bad symptoms following its use have been published in the medical journals, so that it is now generally admitted that the artificial salicylic acid and its salt of sodium are dangerous to animal life, while natural salicylic acid and its salt of sodium are not. Further, it has been shown that the difference is attributable to an impurity in the artificial acid, not a trace of which exists in the natural salicylic acid. The character of the impurities in the artificial salicylic acid, or the nature of the toxic principles contained within it, were not recognized, however, until they were separated by Professor Dunstan. Professor Dunstan has separated from the artificial salicylic acid three acids, which he recognizes as meta-cresotic acid, ortho-cresotic acid, and para-cresotic acid, the first of these occurring in the form of hard, white crystals, with a melting-point of 174.5° C.; the second occurring in the form of white, silky crystals, very light, with melting-point of 163° C.; the third being a whitish powder, somewhat like coarse flour, with a melting-point of 151° C.

The physiological action of these acids was tested by Dr. Charteris, who found that the ortho- and para-cresotic acids are slow but certain poisons, causing prostration and paralysis, affecting first the hind legs, and extending gradually over the body. The lethal dose for the rabbit is about 1 grain for every pound body-weight. The meta-cresotic acid was found to be innocuous.

As the melting-point of artificial salicylic acid is 157° C., the conclusion from these experiments seems to be that the high melting-point is not the only or the best test for purity, but a stronger test is required, and this is that the artificial crystals should be identical with those of the natural variety, for crystallization seems to be absolutely essential to secure a uniform and harmless physiological action.

The authors further conclude that if salicylic acid be prepared from synthetic carbolic acid, having a melting-point of 42° C., it then contains no impurity, but this pure carbolic acid is about three times the price of the ordinary form used, so that until this can be purchased at a cheaper rate, a more economical plan is to produce salicylic acid from ordinary carbolic acid, and subsequently to purify it. A pure salicylic acid should have a melting-point of 157°, and should occur in the form of white, separate, prismatic crystals, inodorous, tasting at first sweetish, then acid. Soluble in about 500 parts of cold water and 15 of boiling water; readily soluble in hot chloroform; soluble in chloroform and ether. Melting-point about 157° C.; dose, 10 to 30 grains.

The purified salicylate of sodium should be made by the action of the purified salicylic acid on carbonate of sodium, and should occur in the form of well-defined, white, odorless crystalline scales, having a sweetish, saline taste; soluble in $\frac{9}{10}$ part of its weight in water, or in 6 parts of rectified spirit; dose, 10 to 30 grains.

There can be no doubt but that much of the disrepute which has attended the administration of salicylic acid and its salts in rheumatism have been attributable to impurities resulting from the employment of the unpurified artificial acid; and it would seem from

the results of Dr. Charteris that, if the pure acid only be employed, its administration might be pushed to the full extent without risk, and that we may almost conclude that we have in it an absolutely reliable, safe, and almost specific cure for rheumatism and rheumatic affections. More than this, the use of salicylic acid is not confined to medicine, but has been largely used the world over for the preservation of food substances. If, therefore, it be true that commercial salicylic acid is poisonous, and the cause of its toxicity has been discovered, the importance of these facts cannot be overestimated. It is true that in France we find the use of salicylic acid for food preservation purposes condemned as illegal, but there is no doubt that it is largely so employed. Moreover, it appears that the greater part of the salicylic acid sold in Europe, and perhaps in this country, is made in Germany, and the manufacturers there practically admit that they are selling an impure article, for they place on the market what they term a crystalline acid for twelve cents a pound more than the commercial article, and an article which they term a pure acid at seventy-five cents per pound more than the former. It is, therefore, almost self-evident that the cheaper article, which is used for commercial purposes, is artificial salicylic acid contaminated with paracresotic acid. It has been stated that, in Germany especially, the beer, which is used so freely there, contains a considerable quantity of artificial salicylic acid, which, if true, would, without doubt, charge the salicylic acid with the intoxication which may follow its employment rather than the small amount of alcohol contained in it.

QUININE HYPODERMICALLY.

THERE are frequently conditions arising which necessitate the administration of quinine in a form that will be readily and promptly absorbed and distributed through the circulation. This is especially so in pernicious intermittent and remittent fevers, where the life of the patient is at stake and prompt action is demanded. There are other times when the natural channel—the stomach—is not available on account of irritability of that organ, or a catarrh of the gastro-intestinal mucous membrane, which require some other method of administration. Under such circumstances the hypodermic injection of quinine naturally offers itself, and, under certain restrictions, is very proper treatment. The various salts that have been used for this purpose are the sulphate, bisulphate, hydrochlorate, hydrobromate, hydrochlorate of quinine and urea, sulphovinate, and kinate.

The sulphate, while it contains about seventy-four per cent. of the alkaloid, should not be used hypodermically if any of the other salts are available, as it requires 740 parts of cold water and about 30 parts of boiling water to dissolve it, or the addition of a large amount of acid,—say a drop of dilute sulphuric acid for each grain of the salt. This is naturally an irritating solution, and an abscess is the frequent result if it is employed.

The bisulphate contains about sixty per cent. of quinine, or fourteen per cent. less than the sulphate, and is soluble in 10 parts of cold water and very soluble in boiling water. This is one of the salts most frequently used, as it is possible to obtain it in any ordinarily good drug-store.

The hydrochlorate is less soluble than the bisulphate, requiring 34 parts of cold water, but contains eighty-one per cent. of quinine, or seven per cent. more than the sulphate. It is soluble in 1 part of boiling water, and is frequently used by heating a mixture made with cold water until solution is effected, and injecting it hypodermically while still hot. This practice should not be followed, as the saturated solution is very apt to precipitate in the cellular tissue, with resulting irritation. It is a good rule never to use injections at a temperature above 100° F.

The hydrobromate—nearly of the same strength in quinine as the bisulphate—is soluble in 16 parts of water. Like the hydrochlorate, it is soluble in equal parts of boiling water, but the same objection applies to injections of concentrated solutions, though to a less degree, as it requires only half the quantity of water to dissolve it, grain for grain. Gubler, Raymond, and Soulez report very favorably upon its use in intermittents, which are said to have ceased after two injections of 3 grains each.

It is not superior, if equal, to the bisulphate. It is stated that a ten per cent. solution in a mixture of 25 parts of alcohol and 75 parts of water is not irritant when used hypodermically, though we should be inclined to doubt it.

The kinate, which, according to Bartholow,

is much used at Guy's Hospital, but seems to have attracted little attention in this country, need only be mentioned. It is obtained by decomposing sulphate of quinine with the kinate of barium.

The sulphovinate is a very soluble preparation, requiring only 3 parts of water at 60° F., and is readily prepared by double decomposition between the alcoholic solutions of sulphovinate of sodium and sulphate of quinine.

The hydrochlorate of quinine and urea has seemed to some investigators to possess advantages over all the other preparations of quinine for hypodermic use.

It is formed by combining 20 parts of muriate of quinine, 12 parts of muriatic acid, and 3 parts of urea, and is soluble in equal parts of cold water. It represents sixty-one per cent. of quinine, and is usually employed in a fifty per cent. solution.

Gubler, who brought forward the hydrobromate, speaks very highly of it, while Kōbner seems to prefer the hydrochlorate in a solution with glycerin, but without acid, giving from 1¾ to 3¾ grains at each injection. He obtained brilliant results in cases of intermittent neuralgias, the injections being made in the back as a usual thing. Kohn claims that acute exacerbations in chronic mental disease can be aborted or cut short by the subcutaneous injection of the hydrochlorate according to Kōbner's method, giving twelve grains in four punctures.

Baccelli, to whose paper we alluded some time ago, reported to the Italian Medical Society the results obtained in cases of malaria from the intravenous injection of a one per cent. neutral solution of quinine, to which a little chloride of sodium had been added, and claimed that when a proper dose was administered—say from 4½ to 15 grains—complete defervescence generally followed.

In our own experience the best results have been obtained from the use of the hydrochlorate of quinine and urea, and we recall a case where, for five days, an injection of 8 grains of this salt was made morning and evening. The site selected for the puncture was the outside of the thigh, alternating with the two legs. After the first hour there was no complaint of pain, and in no case was a sore produced.

To sum up, we would rank the preparations as follows: Hydrochlorate of quinine and urea, bisulphate, hydrobromate, hydrochlorate, and last the sulphate.

Reports on Therapeutic Progress.

DERMATITIS AS AN EXCRETORY SYMPTOM.

Dermatitis is generally regarded as a symptom, yet every-day practice shows that it is commonly treated as a disease. Inflammations of the skin, however, with their many modifications, are to a very great extent of secondary origin. Dermatitis may be held to include any inflammation of the skin characterized by various degrees and stages of redness, heat, swelling, and pain. It usually begins in the form of minute papules or vesicles, either of which may turn to pustules. The inflammation, at first punctate, becomes diffuse, or, under some circumstances, —*e.g.*, the application of a general irritant,— is diffuse from the beginning. It terminates in (1) resolution, (2) ulceration, (3) suppuration, or (4) assumes a chronic form. *Excretion* may be defined as the throwing off from the body of various products, normal or otherwise.

In a paper published in the *Medical Press and Circular* for October 22, 1890, MR. DAVID WALSH calls attention to the various causes of dermatitis, which, he shows, are made up of two different classes,—*first*, predisposing; and, *second*, determining,—the latter being made up of examples of various forms of irritation, which may be either external, among which he mentions the mechanical and chemical irritants, or internal irritants. The latter may be either mechanical, chiefly vascular in origin, such as blood stasis due to varicose veins or to the œdema of chronic Bright's disease, or chemical irritants, which are attributable to the circulation in the blood of substances producing dermatitis. In the latter class he mentions various products, such as arsenic, the specific poison of various diseases, such as scarlatina and their products, and the irritants resulting from faulty chemistry, such as are presumably present in gout and rheumatism. Of the latter class of chemical and organic internal irritants, the primary punctate character of rashes thus induced points to their probable origin in the coiled glands, whose function is principally that of excretion of the solid portion of the sweat.

The chief channels of exit of waste from the body are the kidneys, lungs, skin, and alimentary canal, each of which throws off water, carbonic acid, and nitrogenous matter. The balance of excretion is maintained ur

varying conditions by compensatory action of the different organs. To take a familiar instance, in hot weather the sweat is abundant and the urine scanty. In an analogous manner the action of all excretory organs is largely interchangeable, a fact taken advantage of every day in practical therapeutics, when one organ is relieved by increasing the action of another, as in the familiar examples of purging, sweating, and diuresis. Similar substances, then, are excreted by the various organs, but at the same time each one favors a particular product. Nitrogenous compounds form the chief feature of kidney elimination, water of the skin, and carbonic acid of the lungs; while the alimentary canal is chiefly concerned in certain highly specialized excretions that discharge an important secondary function in digestion. The kidneys, alimentary canal, bronchi, and skin contain epithelial glands which in our present state of knowledge may be assumed to exert a selective action on the substances brought to them by the blood. The alveoli of the lungs are lined with flattened epithelium, and here the process of excretion is probably to a large extent one of gaseous diffusion.

When accidental or unusual substances are introduced into the blood they can leave the body only by the routes of normal excretion, —namely, through the epithelium of kidneys, lungs, skin, and sometimes of bowel. The exact channel of exit will be determined by varying states of organic health and activity, by external influences, and by the selective action, amount, and nature of the material to be excreted. During the process of elimination the excretory epithelium may escape injury; it may suffer only after prolonged exposure; or, lastly, it may be permanently destroyed.

Accidental or unusual substances in the blood may be discussed under the headings of (*a*) drugs, (*b*) normal products in excess, and (*c*) specific poisons, whether chemical, as that of rheumatism, or due to micro-organisms. The action of all three groups may be compared, first, in their selection of one or more modes of excretory exit; and, secondly, whether in that process glandular epithelium is or is not injured.

(*a*) *Drugs.*—Take the case of a drug like *sulphur*, which appears to be excreted from the blood by all the channels of exit, in the breath, the urine, the sweat, and the fæces. So far as we know, elimination thus takes place without injury to excretory epithelium.

Cantharidin is slowly excreted by the kidneys, setting up local inflammation, as evidenced by the strangury and nephritis that sometimes follow its introduction into the system, as by absorption from a blister. Cantharidin, therefore, appears to be selective of the kidney, and certainly damages its epithelium.

Arsenic is an instance of a drug that injures several channels of excretion. For the skin it is said to cause a kind of cancer. The gastro-intestinal irritation set up by large doses seems to be mainly due to excretion through the alimentary canal. The chief channel of exit is the kidney, which, strange to say, does not appear to be injuriously affected.

(*b*) *Normal Products in Excess.*—Urea affords a well-marked example. When present in abnormal amount, whether from overproduction or from deficient elimination, it seeks damaging excretion by all the channels through which it normally escapes, as shown by the dyspepsia, diarrhœa, bronchitis, and skin-affections of uræmia.

(*c*) *Specific Poisons,*—1, *Chemical;* 2, *Resulting from Micro-Organisms.*

1. *Chemical,—e.g.*, rheumatism and gout. The poison of rheumatism—probably lactic acid—does not seem to do much injury to excretory epithelium. That it does so occasionally, however, may be inferred from the bronchitis, the anomalous skin-affections, and the dyspepsia commonly met with in the course of the disease. As in the case of arsenic, the kidneys appear to escape. The poison of gout, on the other hand, is highly damaging to epithelium. That it is excreted generally is shown by the bronchitis and asthma, the eczemas, the nephritis, and the dyspepsia, with which the disease is characterized. Care must, of course, be taken to avoid the fallacy of including these symptoms when secondary to kidney mischief.

2. *Poisons due to micro-organisms* include those that are presumably present in specific diseases, as the exanthems. Excretory damage might equally result from the passage either of the actual organisms or of their products, such as ptomaïnes.

The products of measles is excreted, as a rule, without much damage to epithelium, although at times lung inflammations and nephritis may follow. The skin recovers readily after slight desquamation. A marked contrast is offered by the scarlatinal poison, which appears to be got rid of by all the excretory exits and to be highly damaging to epithelium. This is shown by the accom-

panying nephritis, peeling of skin, and inflammatory conditions of the throat, lungs, and alimentary canal. That there is direct excretion of the main poison by the skin may be inferred from the activity of the shed epidermis as a source of infection. In scarlet fever the dermatitis begins as a minutely punctate rash. On the hypothesis of excretory irritation, a probable explanation is that the poison seeks elimination by the coiled glands, which are thereby inflamed. Peri-follicular inflammation follows along with vaso-motor changes that lead to the diffuse rash of later stages.

Thus far it has been seen that certain drugs and specific organic poisons have more or less selective channels of excretion; that those exits are to some extent interchangeable; and, lastly, that there is a wide difference in the amount of damage inflicted upon excretory epithelium. The next step will be to trace further analogies between drugs and specific disease poisons.

The action of sulphur and of the scarlatinal poison may be compared, in so far that each seeks elimination by every possible method of excretory exit. There is this great difference, however, that whereas sulphur does not injure cells in its passage, at any rate to any appreciable extent, the virus of scarlatina, on the other hand, is highly damaging to glandular excreting tissues. In the latter respect the exanthem may be compared with gout, the chemical poison of which is extremely irritating to excretory epithelium. The two diseases may be tabulated:

Scarlatina.	Gout.
Kidney. — Nephritis: large white kidney.	Granular, contracted.
Skin.—Punctate and diffuse desquamative dermatitis.	Eczemas: urticaria; acne; acne rosacea.
Mucous Membrane:	
a. Alimentary. — Pharyngitis; dyspepsia.	Dyspepsia.
b. Respiratory. — Bronchitis; pneumonia.	Bronchitis; asthma.

In seeking to establish excretory parallels, it is not easy to find any one drug that damages glandular exits all round like scarlatina and, to a lesser degree, gout. Were sulphur harmful to epithelium it would furnish an exact parallel. Such a result might perhaps be obtained by a combination of two or more drugs,—*e.g.*, arsenic and cantharidin. The latter affects the kidneys, while the arsenic irritates the skin, and in larger doses the intestines by elimination. It is still more difficult to name a drug that would specifically injure the remaining channel of exit,—viz., the lungs.

So far those substances only have been discussed which have a well-marked action upon epiblastic and hypoblastic structures. Next compare any drug and a disease poison having an irregular and modified action on excretory organs, but which exerts a good deal of action upon mesoblastic tissues. The author shows that iodide of potassium and the specific poison of rheumatism may be taken for this purpose.

Iodide of potassium is excreted from the blood chiefly by the kidneys, so far as we know, without damage to epithelium. Iodism may be regarded as the expression of its vicarious excretion by other channels. The skin has not the same facilities for getting rid of the drug possessed by the kidneys, and in this way the papular rash of iodism may be due to skin-glands inflamed by slowly excreting iodine. Further excretion through mucous membranes would account for the coryza, metallic taste in the mouth, and bowel symptoms. Any interference with the prompt passage of the drug by way of the kidneys probably favors the development of iodism. Whatever the real explanation of its vicarious exits, iodide of potassium appears to act chiefly on mesoblastic tissues, with occasional irritation only of eliminating channels. In much the same way the poison of rheumatism, generally believed to be lactic acid, spends most of its force on the fibrous tissues, but sometimes damages the exits, as shown by various manifestations of dermatitis, often anomalous, by bronchitis, and by gastric or intestinal dyspepsia.

Iodism may be further compared with uræmia. The drug condition may be not unreasonably regarded as the expression of an excess of iodine in the blood greater than can be at once carried off by its ordinary channel, the kidney.

In uræmia the symptoms are commonly the cumulative result of defective kidney action. There is excretory bronchitis and asthma, excretory skin-affections, and excretory intestinal troubles, such as dyspepsia, vomiting, and diarrhœa. One should be careful, of course, to avoid the fallacy of including symptoms due to poisoned nerve-centres or nerve-trunks, a remark which applies equally to all the other illustrations advanced in this paper.

The fact of varying elimination partly explains the uncertain action of many drugs,

and also the widely-differing symptoms of specific diseases. Given an abnormal substance circulating in the blood, with a choice of several excretory channels, then it may be easily imagined that a trifling cause will determine its particular exit. A check to the action of the skin in scarlatina may cause fatal excretory nephritis; whereas, a good sweating may bring out an exanthematous rash to the relief of the patient. In the case of iodide of potassium, it has been suggested that the drug may desert its ordinary exit, —the kidney,—and seek elimination by way of the skin and mucous membranes. The gouty poison, again, by leaving the kidney, may give rise to diarrhœa or eczema. In certain rare instances, the metastatic action is so marked that patients have it in their power to choose between the last-mentioned evils. Or take the dermatitis of an improperly-fed child, whose blood is laden with irritant products. Exposure to cold will very likely cause bronchitis with disappearance of the rash. The popular idea that the rash is driven inward may be expressed more scientifically by saying that the channels of excretory elimination are changed. A rational answer is afforded to the ancient problem as to whether it is right to cure a skin-trouble that is likely to be followed by internal manifestations. Such treatment is sound if one can be sure of directing excretion to a channel where serious or permanent damage will not ensue. No great harm, for instance, will be done by starting a diarrhœa to the relief of an eczema. On the other hand, to mitigate a scarlatina rash by throwing the stress of elimination on the kidneys, would probably sooner or later kill the patient.

Disease poisons take all kinds of erratic courses. Thus, scarlet fever may prove fatal without rash, without sore throat, or without kidney mischief, or a poison which ordinarily attacks epithelial organs may spend its force on mesoblastic tissues. Gout acts in this way in its retrocedent forms, and its action then more nearly resembles that of rheumatism,—a disease where damage to epiblastic tissues is of a trifling and secondary nature.

The relation of excretory irritation to dermatitis may be more exactly illustrated by a short summary of the skin-affections of rheumatism and gout. In rheumatism, as a rule, this class of symptoms is neither well marked nor serious. Urticaria is common, and also anomalous eczematous conditions, with the local congestion round hair follicles, known as *lichen pilaris*. That the rheumatism poison is excreted by the skin is rendered more than likely by the acid and sour-smelling nature of the sweat, while its irritating effect may be inferred from the minute papular and vesicular rashes that often accompany acute attacks. Other explanations of the lesions are, of course, possible, as, for instance, where the rheumatic poison acts as a remote irritant through the nerve-centres or the nerve-trunks, or where the gland-ducts have become plugged from disuse.

In rheumatism, then, we have a specific poison that spends its force chiefly on mesoblastic tissues, and occasionally inflames the epithelium of excretory exits. In gout, on the other hand, the poison sometimes attacks the deeper parts, but far more commonly damages the cells of epiblastic excretory organs. Hence one would expect the skin complications of gout to be both numerous and severe.

All through life gouty patients are subject to eczema and urticaria, as well as to anomalous intermediate forms. A typical eczema sometimes occurs during an acute attack, and disappears under specific treatment. Asthma is common, and often alternates with eczema, or with diarrhœa; in other words, the poison is shifting its channel of elimination. On the whole, a patient may consider himself fortunate if the gouty poison seeks its expression in skin, in lung, and in intestinal troubles, thereby avoiding the kidney outlet and its consequent nephritis. Rational treatment recognizes this advantage, and aims at keeping up the action of the skin and bowels, while abnormal production of the irritant is limited by appropriate measures.

From the foregoing considerations the following conclusions may be drawn:

1. That dermatitis may be set up in a certain number of cases by the excretion of irritant products from the system.

2. That such irritants may be either chemical or due to specific micro-organisms and their products.

3. That many of the inflammations of the hypoblastic, as well as of the epiblastic, tissues are simply expressions of excretory irritation.

4. That the severity of the inflammation and consequent damage is in proportion to the specific effect of the irritant upon excretory epithelium.

5. That excretory parallels may be drawn between drugs and specific disease poisons, both as regards their channels of elimination and their harmfulness to epithelium.

6. That while excretion affords the key to a certain number of skin inflammations, it also accounts for the success of many well-established methods of treatment which aim at shifting the channels of elimination. At the same time it affords a rational basis for further therapeutic measures.

7. And finally, some observers trace the tendency to catarrhal troubles—the "eczematous condition"—to an unstable epithelium. Others refer them to disorders of the nervous system, such as trophoneuroses. While freely admitting there are wide differences of predisposition in individual skins, yet it seems probable that the dermatitis is not infrequently an excretory symptom secondary to a blood condition.

SOME POINTS ON DIETETICS.

Our advice is sought in the matter of diet in two different sets of cases. In the one set the patient is seriously ill, and disabled more or less completely from pursuing his ordinary avocations, or he is suffering from some disease which requires a special dietetic treatment, such as diabetes or gastric ulcer. In the other set the patient is only troubled with some slighter ailment or indisposition which does not incapacitate him from taking his part in the world's work, nor necessitate any deviation from his usual habits. In the former class of cases the diet often requires to be entirely transformed, the customary routine has to be abandoned, and the order, quality, and quantity of food have to be rearranged to suit the exigencies of the morbid state, with an almost complete abandonment of any thought as to what might be most suitable in health, and might best promote the success of the individual as an actor in the struggles and competitions of life. When a man is struck down with fever, or is smitten with some organic disease, we need not consider what diet is best fitted to bring out his physical and mental powers; the business in hand is to advise what is best to keep body and soul together until the fever storm be passed, or, what is best, to minimize the incidence of the organic trouble, and to lengthen out existence to the utmost possible span.

But the case is far otherwise with the second group, which forms the larger proportion of those who seek our advice, and who question us anxiously as to what they shall eat, drink, and avoid. These have no organic disease, and go about their business or pleasure as usual. They complain, perhaps, of some dyspeptic trouble, some bodily discomfort, or mental worry or weariness; or of a want of a sense of tranquil and vigorous life; or they are getting on in years, and feel the premonitions of old age; or they belong to that class of neurotics who imagine themselves ill,—persons who ponder over their sensations, and give excessive thought as to what they shall eat and what they shall drink. Most of these inquire of us what aid we can give them by a judicious management of their diet, not only to keep well and live long, but also to maintain that health with maximum vigor, both of body and brain.

Now, with regard to the first group, the advice tendered by us on points of diet displays a fair degree of unanimity. We do not differ much as to the dietetic management of a case of fever, or of diabetes, or of gastric ulcer, or, indeed, of any of the more serious forms of sickness. But, in regard to the second group, in the case of persons who are substantially healthy, the advice tendered by different practitioners is apt to show a lamentable want of consonance, or even a total contradiction.

It is in this class of cases especially that the paper read by SIR WILLIAM ROBERTS at the opening of the current session of the Manchester Medical Society, and reported in the *British Medical Journal* for October 18, 1890, is especially important, as indicating the right method of investigating questions relating to diet.

An attentive examination of the dietetic customs of civilized races reveals very clearly that there are two distinct indications aimed at,—one is to subserve the needs of general nutrition, and the other is to subserve the needs of the higher functions of the brain and nervous system. It may be said that bread and other cereal articles, leguminous seeds, the various products of the dairy, fruits and vegetables, the harvest of the sea, and meat are designed to minister to the former purpose; and that tea and coffee and the various forms of alcoholic beverages are designed to minister to the latter purpose. With this second group should also be classed tobacco, for, although tobacco cannot be regarded as food, its use must be ranked with our dietetic customs. Strictly speaking, meat, or at least some kinds of meat, should probably find a place in both categories, for it possesses certain stimulating properties which distinguish it from vegetable and

dairy products. Tea and coffee and alcoholic beverages are sometimes branded as luxuries. What is a luxury? You cannot rightly class as luxuries—meaning thereby something that has no solid utility to the species—articles that are in general use among a successful and ascendant community. The very fact that they have attained this position is, to a naturalist, evidence sufficient that in some way or other the community as a whole, and in the long run, benefits by their use. The struggle for existence—or, rather, for a higher and better existence—among civilized men is almost exclusively a brain struggle; and these brain foods, as they have been not inappropriately termed, must be regarded as a very important part of the equipment for that struggle.

One of the most characteristic features of our national dietary is its *variety or diversity*. Not only are our several daily meals framed on a different plan, but the meals of one day differ more or less from the corresponding meals of another day. We may be quite sure that this diversity serves some useful end. In drawing up schemes of diet we are not, therefore, justified in neglecting this feature and in reducing the diet-list to a dead level of monotonous uniformity. A want of attention to this point leads us unwittingly to needlessly torment and worry our patients by placing unnecessary restrictions on their choice of food. Some of those commonly imposed are difficult to understand. Most of them probably derive their origin from some crude notions floating through the lay press, and unconsciously lodged in the medical mind. Why, for example, should tea and coffee be so frequently forbidden without any evidence that they disagree with the patient? Or why should the bland, innocuous, and easily-digested potato be so ruthlessly proscribed? Sometimes prohibition takes a wider sweep, and fruit and vegetables are included in one general condemnation. Nor are the rules laid down always self-consistent.

Dr. Roberts suggests a very good rule in regard to the regulation of the diet in cases where there are no special indications to fulfil, and that is, when the patient inquires whether he may take a certain article of food, to put these questions to him,—namely, "Do you like it?" "Does it agree with you?" If the answer is in the affirmative there is no intelligible reason why the use of that article should not be sanctioned. Such a rule is so plain and simple, and so obviously consonant with good sense, that it might scarcely appear worth while, or even dignified, to make formal mention of it were it not so well established in the experience of all that it is constantly violated.

Dr. Roberts compares the palate to a dietetic conscience at the entrance gate of food, with the appointed function to pass summary judgment on the wholesomeness or unwholesomeness of the articles presented to it. It acts under the influence of a natural instinct which is rarely at fault. This instinct represents an immense accumulation of experience, partly acquired and partly inherited. It is, of course, not infallible; no instinct is, but so close and true are the sympathies of the palate with the stomach and the rest of the organism that its dictates are entitled to the utmost deference as those of the rightful authority in the choice of food. In addition to the importance which is to be given to the teachings of the palate, which he states it is necessary to study in individual cases, attention is called to the advantage to be gained from change of diet. A course of two or three weeks of vegetarian regimen occasionally proves most grateful, especially in the case of habitual heavy feeders. Similarly the total abstinence from alcoholic beverages is often highly salutary, and most of all for those whose daily potations are on a liberal scale. These two examples represent the experiments which are indicated in their absolute strictness in but few cases, and Dr. Roberts shows that slighter alterations are often of signal benefit,—thus, changes from tea to coffee or cocoa, from one kind of alcoholic beverage to another, from one sort of bread to another. Again, a revision of the order and times of the meals is sometimes beneficial. It is also in some cases effective in removing troublesome insomnia to make an alteration from mid-day dinner to a late dinner or substantial supper. It should, however, be borne in mind that such effects are merely temporary, and that their benefits are exhausted within a month or so, and then a return to the old diet or a new change may be desirable. Another point of practical interest is this, that when certain articles disagree, it is better to lessen the quantity than to forbid; if fruit or vegetables prove difficult of digestion, it is certainly unwise to prohibit them altogether. It will generally be found that if the quantities are reduced to a certain level they can be tolerated and enjoyed. The antiscorbutic properties of fruit and vegetables cannot be safely foregone, and a very

small proportion suffices to fulfil this indication. Again, in reference to the use of potatoes, people do no doubt stuff their stomachs with potatoes, which the organ finds difficult to deal with. But many persons cannot enjoy, or scarcely eat, their dinners without potatoes, and to abstain from them is a great privation. Nor is this necessary; a reduced allowance will solve the difficulty perfectly. Then, again, some persons are abnormally sensitive to tea or coffee or alcoholic beverages, and suffer discomfort from the quantities usually taken. But abnormal sensitiveness is not a proof that the incriminated article is unserviceable, and a diminution of the quantity may prove a better remedy than total prohibition.

Finally, Dr. Roberts adverts to the necessity for revision of the diet to meet these changes in the type of nutrition which naturally takes place as the individual travels on from youth to age. In the normal course the palate and appetite adjust themselves automatically to these altered conditions, and there is a lessened intake of food, but sometimes these adjustments lag behind, and the power of taking food remains unaltered, while the assimilative powers are on the wane. Then some form of nutritive disorder necessarily follows. In most of these cases, but not in all, there is a tendency to stoutness. There are indications of digestive difficulties and of engorgement of the abdominal organs, and signs of that vague condition termed latent or undeveloped gout. The early recognition of this condition is very important, for thereupon depends the prevention or postponement of degenerative processes which hereafter prove formidable. In this conjuncture the observant medical adviser may render invaluable services in detecting the maladjustment, and in taking timely steps for its correction. The most obvious indication is to lessen the quantity of food, and where difficulty is found in controlling the actual amount of food taken, where the appetite is yet strong and the powers of gastric digestion are abnormally active, the less concentrated forms of food are here a useful resource,—green vegetables, salads, and thin soups,—which help to fill the aching void without adding materially to the albuminoid and fatty ingredients of the meal. Tea and coffee are also serviceable in allaying an unseasonable craving for food. A stiff cup of tea or coffee shortly before dinner certainly takes the edge off a troublesome appetite. It is, however, well to proceed cautiously in this direction, for the promptings of nature are not to be lightly set aside. The effects of a contracted diet should be carefully and patiently watched, with an open mind for every sign or suggestion, whether of warning or retreat, or of encouragement to advance. In middle life particular attention should be paid to the quantity of alcoholic beverages. As a very general rule, the tolerance for these articles diminishes with advancing years, and it is necessary nearly always with persons who have used them freely to reduce their quantity when middle age is reached.

In regulating the diet of substantially healthy persons, it is imperative to beware of hard-and-fast lines. Cases of this group are very diverse; scarcely any two are exactly alike, and their management is complicated often by moral and social considerations which are difficult to justly estimate. We can only hope to avoid serious errors by a patient investigation of each particular case, and by bringing to bear upon it a full knowledge, combined with a large infusion of common sense.

A NEW METHOD OF BLEEDING IN SOME FORMS OF PULMONARY CONGESTION.

The subject of bleeding, local or general, is one which is not now much discussed or referred to except in a few rare and exceptional cases. This is to some extent due to bleeding having gone out of fashion, and also largely to the fact that when unskilfully used it is a dangerous and even fatal line of treatment. Under the head of local bleeding are classed some of the ordinary methods which are still in use, and deservedly so, such as leeching, cupping, and the like, while general bleeding, as accomplished by venesection or arteriotomy, is now only rarely practised. That bleeding locally does do good in suitable cases there is no denying, and it is equally true that lives can and will be saved by judicious and timely venesection. This phlebotomy is not one practised in cases of acute febrile diseases, but is rather an extension to another organ of the practice of hepatic phlebotomy as performed by Dr. Harley. This, there is no doubt, has a most beneficial effect in the cases of hepatic congestion in which it is performed. Such a condition can only be very indirectly and somewhat slowly affected by either general depletion or vigorous leeching and counter-irritation over the hepatic regions, for obvious elemen-

tary anatomical reasons. But through it we have the direct method, which, apparently in proper cases and when properly performed, is not attended by risks of effusion or subsequent peritonitis, local or general. That a similar procedure might be of use in the case of engorged lungs not in a state of acute inflammation occurred to MR. J. CHRISTIAN SIMPSON, and he demonstrated its practicability, though rather by accident, in a case of severe cardiac pulmonary congestion which came under his care in August, 1887, notes of which he publishes in the *Lancet* for Novber 1, 1890. The patient was an elderly woman, in whom there was considerable loss of compensation, with mitral regurgitant murmur. The dyspnœa was distressing, and the dulness at the base of the lungs was so absolute and wooden, and the breath sounds so distant, that pleural effusion seemed probable. Accordingly he introduced a fine aspirator-needle, but no serous fluid escaped, and, on thrusting the needle farther in, dark venous blood readily flowed. Although he was not allowed to carry the bleeding as far as he wished, this case showed the ease with which direct local depletion of the lungs could be performed, and he soon had an opportunity of repeating the experiment so indicated in the case of a woman who was the subject of chronic Bright's disease, which did not improve under dietetic and other treatment. One day coma commenced with fibrillary muscular twitchings and intense dyspnœa, accompanied with œdema and congestion of the lungs. Under these circumstances venesection was indicated, as ordinary treatment failed to produce relief. In order to render the pulmonary phlebotomy as safe as possible, the aspirator was used, and the largest canula thrust into the lung-substance at the level of the ninth costal interspace on the left side, the absence of pleural effusion having been previously ascertained. No blood flowing after various manipulations, reducing and increasing the suction power, the whole of the aspirating apparatus was removed, and very shortly afterwards there was a free flow of blood from the canula, which was left *in situ*. After the withdrawal of twelve ounces of blood, the canula was held *in situ*, with the finger over the end to allow a clot to form, and then it was slowly withdrawn altogether. A piece of plaster was applied over the puncture, but a flannel bandage could not subsequently be retained in position. The patient was immediately and markedly relieved, both as regards the cerebral and pulmonary conditions. No effusion took place, there was only trifling hæmoptysis, and a suspicion of a small patch of pleurisy, without a rise of temperature. She remained in a greatly improved condition for a considerable time after this, though she ultimately died comatose.

A third case similarly treated was one of almost complete breakdown of compensation in cardiac disease, there being double mitral and aortic systolic murmurs, as well as well-marked dilatation. Stimulants and cardiac tonics were tried without avail, and, as the cyanosis was somewhat rapidly increasing, the author again tried pulmonary bleeding, in a similar manner, and with a similar immediate beneficial result, which continued for about thirty hours, when the patient died quite suddenly of syncope after some exertion in bed.

The fourth case was one which also terminated fatally, death being due to uræmic convulsions. In this case, instead of a flow of blood, the œdema was so pure that only serous fluid escaped very slowly, and coagulated quickly, thus rendering the process futile. In spite of brachial venesection, which was immediately performed on account of the urgent symptoms, this patient died of the convulsions.

The author believes that, provided suitable cases are chosen and that the operator has the manipulative skill requisite for such an operation, the operation is by no means an unjustifiable one, and is not to be regarded as dangerous. Of course, the cases reported were all of a hopeless character, and only palliation could be expected except in the cardiac case,—the third reported,—and in this valuable time had been lost in medical treatment before the permanent value of such an operation could be tested.

Whether it would be useful as a *dernier ressort* in cases of acute uræmia with pulmonary symptoms remains to be seen ; but there was certainly immediate improvement in the cases where blood was abstracted. The aim and object is to try to get the good of venesection without such a loss of blood and its consequent retardation of convalescence. The process is analogous to a pulmonary apoplexy, which is recognized as being of the utmost benefit in certain cardiac cases, and the pulmonary lesions in both cases have a strong similarity. The broad indications for this seem to be that the case is one which has (1) extreme pulmonary congestion and œdema; (2) absence of effusion into the

pleural cavity; (3) general venous stasis and cyanosis, all of which may occur in the progress of certain heart- and kidney-affections; and (4) that other treatment, medicinal and mechanical, had failed to relieve the symptoms. The coexistence of such congestion without pleural effusion is somewhat rare, and therefore this limits the practice; for the mere aspiration of the pleural effusion is almost invariably followed by such relief in cardiac cases that venesection is not required. It is, therefore, a necessary preliminary procedure to negative the presence of effusion in any quantity that would embarrass the heart's action and impede the pulmonary circulation. To do this thoroughly an exploring needle must be used. The condition of the lungs in a suitable case is such that, as regards the danger of subsequent pneumothorax, little or no air is being interchanged at the proposed seat of puncture, and the elasticity of the lung is quite sufficient to prevent any serious oozing place.

The method of procedure may now be considered *seriatim*. 1. What side is to be the seat of puncture? As a rule, Mr. Simpson thinks, the right side should be chosen if both sides are equally free of effusion, or are generally engorged. The reason for this is evident when it is remembered that such cases usually lie on that side, and consequently the congestion will be greater, and the rest to the lung afterwards will also be greater than on the left side. 2. The site of puncture should be not higher than the ninth interspace posteriorly. 3. The needle to be used is the largest usually supplied with an aspirator, the parts used being the canula and the corresponding trocar and fittings, but it will be found advantageous in some cases to use a probe of a size smaller than the canula. 4. Mode of puncture. This should be done in one thrust, so that there be no danger of one or more small punctures of the lung. If this be not done, the patient will cough and be troublesome, as the visceral layer of pleura is very sensitive; but with one thrust there is little or no discomfort. The depth of canula introduced need not be great at first, and it could only be by great carelessness that any vessel of any size could be injured. The *tactus eruditus* will at once advise the operator of the fact that the end of the canula is in a free space containing fluid. 5. The canula being steadied and the needle withdrawn, the operator should wait for a few seconds to see if any blood flows. If not, the canula should be moved, so as to produce slight laceration, then slightly withdrawn, and usually there is a free flow. If clotting takes place, the smaller probe should be introduced and the canula cleared. The probe being smaller, allows of blood to flow, although it may be *in situ*, and keeps any lung-tissue from the end of the canula. 6. The amount of blood to be abstracted varies according to the case and the results produced, it being, as a rule, less than would be required were venesection adopted. 7. The extraction requires some care. The finger should be placed on the angular aperture of the canula, and either the needle or probe introduced along the canula, and kept there for a few minutes, to allow of clotting to take place in the lung, and then slowly withdrawn. In this way there will be no subsequent hæmothorax or pneumothorax, and slight, if any, local pleurisy. 8. The local after-treatment consists in applying a piece of plaster to the puncture, and a bandage, if the dyspnœa will admit of it.

EXPERIMENTAL INVESTIGATION OF THE ACTION OF CHLOROFORM AND ETHER.

Dr. John A. MacWilliams, in an elaborate "Experimental Investigation of Chloroform and Ether," an account of which has been published in the last four numbers of the *British Medical Journal*, reaches the following conclusions (*British Medical Journal*, October 25, 1890):

1. During the chloroform anæsthesia the blood-pressure is lowered and the heart's action is weakened.

2. Dilatation of the heart occurs to an appreciable extent, even when chloroform is administered gently, mixed with abundance of air (under four per cent. of chloroform vapor in the air).

3. Dilatation may occur even before the conjunctival reflex is abolished.

4. The dilatation affects all parts of the heart more or less, the left side as well as the right. It is not due to changes in the pulmonary circuit.

5. The dilatation is not due to the accompanying fall of pressure, to the diminished resistance to the ventricular systole, or to the diminished blood-supply through the coronary arteries. Dilatation does not result from a similar fall of pressure brought about by means other than chloroform; for example, arterial relaxation caused by section of vasomotor nerves. Dilatation under chloroform often occurs very quickly, before there is any fall of pressure. Moreover, when the dilata-

tion has followed a fall of pressure, it is not removed by artificially raising the pressure; for example, by compression of the abdominal aorta.

6. There is no distinct change in the rate of the heart's action when dilatation occurs. A sudden and complete cessation of the cardiac rhythm is never caused by the inhalation of chloroform. Cardiac failure occurs by a more or less sudden enfeeblement and dilatation of the organ, not by a sudden complete cessation of rhythm.

7. The tone of the heart-muscle is depressed, the cardiac walls become relaxed, and the functional efficiency of the organ is impaired.

8. When the heart becomes greatly dilated it fails to be an effective force in keeping up the circulation, while its rhythmic movement still continues, though so feebly as to be inefficient.

9. Cardiac failure sometimes occurs in this way a considerable time before the respiration stops, though generally the respiration stops before the heart has become incapacitated.

10. The failure of artificial respiration to bring about recovery (in some cases of chloroform collapse), when begun immediately after the spontaneous respiration and distended state of the heart, which has become unable to maintain the circulation. Hence the supply of fresh air (by artificial respiration), free from chloroform, cannot be taken advantage of.

11. The depressing influence of chloroform on the heart—leading to dilatation of its cavities—is not exerted through the vagus nerves, but is a direct effect of the drug upon the cardiac mechanism. Section of both vagi does not obviate the weakening and dilating influence of chloroform upon the heart.

12. The weakening and dilating effects of chloroform are sometimes manifested in tolerably equal degree on both auricles and ventricles; but sometimes more readily upon the auricles, and at other times upon the ventricles.

13. A peculiar periodic depression of the ventricular action sometimes occurs during recovery from the primary effects of chloroform.

14. The contrast between the relation to the heart's action of chloroform and ether in anæsthetic doses is very marked. With chloroform, cardiac dilatation frequently occurs—and often, indeed, a very marked dilatation—before the conjunctival reflex is abolished. With ether, the induction of anæsthesia with complete abolition of the conjunctival reflex has not been attended by any noteworthy dilatation; indeed, effects of a stimulating character have sometimes been observed, and the peculiar periodic ventricular depression sometimes following chloroform has been seen to be removed.

15. Under the influence of chloroform a temporary slowing of the heart's action sometimes occurs,—from asphyxial conditions or from sensory stimulation during imperfect anæsthesia. This slowing is quite different in its nature and causation from the enfeebling and dilating effect already mentioned. The slowing is not due to direct influence of chloroform on the heart, but is indirectly brought about through the vagus nerves. It does not appear to be dangerous in the healthy animal.

16. The occurrence of fibrillar contraction (delirium cordis) does not appear to be a primary mode of cardiac failure from the inhalation of chloroform in the healthy animal, though it may sometimes supervene when the heart has become distended and incapacitated by chloroform.

17. The fall of blood-pressure under chloroform is in its earlier stages due mainly to the depressing effect of the anæsthetic on the vaso-motor centre, preceded often by a slight stimulation; the later stages are associated with failure of the heart as well as of the vaso-motor centre.

18. The relative occurrence of cardiac dilatation and vaso-motor depression varies. Sometimes the heart begins to dilate early,—before there is any fall of pressure; at other times a large fall of pressure may occur before cardiac dilatation becomes marked.

19. The lowering of the blood-pressure is in a certain sense protective; it retards the access of more chloroform to the vital organs. But, on the other hand, the fall of pressure may become excessive and produce dangerous effects.

20. In certain circumstances, when chloroform is very suddenly taken in, a dangerous dose may be absorbed, and the heart may become seriously affected *before* the vaso-motor centre has had time to be much depressed.

21. When a fall of carotid pressure has been brought about by the *gradual* inhalation of chloroform in the ordinary way, firm pressure applied to the abdomen causes a marked rise of pressure,—very much more than can be obtained by inversion of the ani-

mal. And even when the fall of pressure is due to the *sudden* inhalation of an excess of chloroform, pressure on the abdomen commonly, but not in all cases, leads to a decided rise in the carotid pressure. The existence of cardiac failure may prevent the possibility of such a change.

22. Changes in the respiration exert a most important influence upon the effects of chloroform administration. An amount of chloroform which can be given with safety during easy breathing may speedily become dangerous during deep, rapid respiration.

23. Free dilution of chloroform with air—the restriction of the percentage of chloroform vapor to four or four and a half per cent.—gives no security against an overdose. A percentage that gives safe anæsthesia during ordinary breathing may lead to fatal collapse if given during exaggerated respiration.

24. Changes in respiration may be excited by sensory stimulation (operative interference, too strong chloroform vapor, etc.) during imperfect anæsthesia. Rapid, gasping respiration occurring in such circumstances is usually accompanied by a rise in blood-pressure, and, as there may be already a considerable amount of chloroform in the circulation, there occurs a combination of circumstances specially favorable for the speedy and sudden development of dangerous collapse.

NOTE.—I hope soon to publish tracings illustrative of some of the experimental facts described in this report.

THE TREATMENT OF INTERNAL HEMORRHAGE.

There are few more trying positions which the practitioner of medicine can find himself suddenly forced to occupy than that of facing a severe internal hemorrhage, whether cerebral, pulmonary, gastric, intestinal, or uterine. It is with the view of summing up our knowledge on this subject, and to aid the practitioner in such disturbing emergencies, that we largely reproduce the paper with the above title, published by DR. JOHN FERGUSON in the *New York Medical Record* for November 1, 1890.

In the first place, it is very apparent that the amount of blood that will flow through a rent in the wall of any vessel must be greatly influenced by the total amount of blood in the system and the amount of pressure upon the vessel from within. This being the case, the first step to take in dealing with a hemorrhage is to cut off the supply of liquids. In this way the amount of blood is kept down, while it becomes thicker in quality and better fitted for the forming of a good, firm clot in the torn or ruptured vessel. Another step in the same direction is to reduce the volume of blood by actively eliminating water from the system. The hypodermic injection of pilocarpine rapidly unloads the body of water and inspissates the blood left behind, lessening thereby the freeness of the flow. This would not, however, be suitable in cases of pulmonary bleeding. Other diaphoretics might be selected, according to the judgment of the physician, or the nature of the case and the condition of the patient.

Another group of remedies is of much value in dealing with such cases. Those purgatives that produce copious watery stools, and at the same time are not irritating or depressing, must be placed high on the list of things we may use for the relief of the sufferer intrusted to our charge. Of these purgatives there is none so good as Epsom salts,—the sulphate of magnesium. When given in saturated solution, without water, in free doses and oft repeated, very free watery evacuations are produced, the amount of fluid in the vascular system is speedily lessened, and the hemorrhage to this extent controlled. By maintaining this action for some time, the ruptured vessel has time to heal, because the pressure is largely taken off it, and it is put into the condition of rest. In addition to this, however, the blood is thickened. In some cases of cholera—sporadic or epidemic—where the rice-water stools have been very abundant, the blood becomes so reduced in volume and so inspissated as not to flow from a wound made in a large vein. In the event of the hemorrhage being due to the ulceration of typhoid fever, this plan could not be had recourse to, though it might be used with advantage in the bleeding of a gastric ulcer. In the hemorrhage, often so free, from soft and rapidly-growing uterine fibroids, it is specially useful if continued long enough,—say for months.

Some persons have a strong tendency to bleed, and any hemorrhage is difficult to stay. In such conditions Dr. Ferguson states that he has found the following formula to be highly serviceable. Mix one ounce each of absolute alcohol or oil of turpentine in a glass or wedge-wood mortar; to this add very slowly, stirring all the while, one ounce of

sulphuric acid. After all chemical action is over, the mixture may be bottled; of this, 10 or 15 minims may be used every two, three, or four hours, as needed.

In the event of a very severe post-partum hemorrhage, the medical attendant may try ergotin hypodermically, or hot vaginal or rectal injections; but these may fail. It is a belief, not yet quite dead, that the uterine sinuses are closed by clots. This is quite erroneous. The uterine vessels and sinuses are interlaced by muscular fibres, and it is the contraction of these that arrests the hemorrhage. This muscular tissue, as it were, ligates the vessels that would bleed, and, so long as the contraction is good, there is no danger. Now, for the maintenance of this tonic action of the muscular tissue in the uterus, Dr. Ferguson has found the application of heat to the lumbar portion of the spine very useful. It stimulates this portion of the nervous system by bringing more blood to it. There is a greater influx of nerve-energy to the uterus and contraction is brought about. It is true that the uterus seems to be very independent of the spinal cord, and labor may take place in a paraplegia. This does not, however, invalidate the fact that heat—applied to the spine by a large sponge dipped into hot water—does much good in the way of rousing the uterus to action. But when all things fail, as fail they will at times; when ergotin, acetate of lead in large doses, hot injections, and heat to the spine disappoint us, we have one last resort,—tampon the uterus and vagina thoroughly with iodoform gauze, or, if this is not at hand, some cloths to which glycerin is added. This plan will seldom fail. The bleeding is soon arrested, the uterus begins to contract, tone in its walls is secured, and one can feel at ease that the patient is out of all immediate danger.

As a means of arresting hemorrhages and gaining time for other remedies, Dr. Ferguson suggests the following plan, one great feature of which is that it is always available and does good. It is applicable to cases of capital operations on the body, such as the removal of large and vascular tumors from the neck, the female breast, etc. The plan is simply to tie bands around the legs and arms close up to the body. This arrests the return of blood to the body, while the flow of blood into the limbs still goes on. By this means a very large amount of blood in the body is rapidly collected into the four extremities and the pressure taken off the central vessels.

ABUSE OF DRAINAGE OF WOUNDS.

At the meeting of the Medical Society of London, held October 27, 1890 (*Lancet*, November 1, 1890), MR. LOCKWOOD read a paper on the "Abuse of Drainage of Wounds." He began by remarking on the great benefits which had accrued from the systematic drainage of wounds, and proceeded to argue that this had led to considerable abuse of the process. Although of late there had been some reaction, he thought it not improper that the subject should be discussed. The necessity of drainage in the case of wounds made by the surgeon in healthy tissues was first discussed. An ideally-successful wound was defined as being one which healed without constitutional disturbance and under a single dressing. Obviously the insertion of a drainage-tube rendered this consummation impossible, as the dressing had to be changed for its removal. Next the inefficacy of drainage-tubes was mentioned, and cases given to show how frequently, when the wound was aseptic, they were found blocked with blood-clot, the dressings being practically unstained. The asepticity of some of the cases had been properly ascertained by the inoculation of cultures. A similar objection was taken to soluble drainage-tubes,—namely, that they were just as liable to become occluded. It was quite unnecessary to drain with the view of giving exit to blood, as by proper precautions none need be effused. Further, should any collect, it did no harm so long as the wound was aseptic. The occurrence of serous inflammatory effusion was next discussed, and first wounds were described which had been treated without drainage, and in which none had been seen. These wounds included amputation of limbs, extensive amputations of the breast, and operations for hernia and for the removal of tumors. Some of these had been tested and found aseptic. Next, similar wounds were referred to in which some effusion had occurred, but in which it had been harmless. Wounds in which there was much effusion had been tested, and always found to be septic. The latter condition was thought more potent than chemicals, foreign bodies, or want of pressure in causing effusion and subsequent suppuration. The importance of the systematic testing of wounds was referred to. Many so-called aseptic wounds were in reality septic. Whenever it had been necessary to remove button sutures or drainage-tubes in order to dress a wound, and the wound had been proved aseptic, the greatest confidence was felt in the ultimate result, and the

first dressing was always the last. Anything short of asepticism was unsafe, especially if drainage was omitted and the wound put up to heal under a single dressing. There was no method which allowed harmless contaminations to enter but excluded the harmful. Cases were quoted of severe wounds treated without drainage, and which healed beneath a single dressing. They easily carried off the palm for rapidity of healing, painlessness, and economy. The use of drainage in abdominal wounds was mentioned. In such cases drainage was the exception and not the rule, and the same ought to apply to other operations. There were some regions in which the omission of drainage seemed hazardous, particularly in those which involved the scrotum, the triangles of the neck, and perhaps the loose tissues within the abdomen. Wounds in tissues in which septic processes were established needed drainage, although cases were mentioned which seemed to show that a distinction ought to be made between those which were chronic and those which were acute. The relation of the constitutional state of the patient to drainage was next mentioned, and the question of auto-infection of wounds mentioned, and a supposed instance given. Last, the precautions which had been adopted were described. Stress was laid upon the preparation of silk (which was alone used for sutures and ligatures), sponges, and instruments, the latter by boiling in soda and water. The five per cent. carbolic gauze and alembroth wool seemed to make the best dressing, the whole being adjusted with Martin's rubber bandages.

MR. REGINALD HARRISON, though admitting the usefulness of the drainage-tube, could not regard it as an unmixed blessing. There were certainly many conditions under which it could be entirely dispensed with.

MR. ALBAN DORAN said that no appliance introduced within the last twenty years had done more good in abdominal surgery than the drainage-tube if properly used. It was a contrivance intended for permitting the pumping out of fluid from the abdominal cavity, and was one of the greatest safeguards after adhesions had been broken down. It had been abused, because it had been used where not wanted, and when employed it had often not been used properly.

MR. ROSE believed that a drainage-tube during the first twenty-four hours was useful to take away excess of blood. When the tube was blocked with blood, it had already done its work.

MR. H. ALLINGHAM thought the use of a drainage-tube was often better than employing the amount of pressure necessary to keep the wound in accurate apposition.

MR. LOCKWOOD, in reply, thought that a drainage-tube put in and taken out again within twenty-four hours simply to remove blood that should have been stanched at the time of operation was a confession that the highest ideal in surgery was not being aimed at. He was not now using so much pressure as he did at first. He regarded the method he advocated as economical both as regarded time and expense.

THE TREATMENT OF ANEURISM BY THE FORMATION OF WHITE THROMBI WITHIN THE SAC.

In certain regions of the body, such as the extremities, aneurisms can be so treated by the application of an aseptic ligature applied to the vessel on the proximal side of the aneurism that this mode leaves little to be desired. There are occasionally, however, even among aneurisms of the extremities, instances of arterial disease of such a nature and extent as to render the application of a ligature upon a large vessel in its continuity hazardous. A mode of treatment which would subject the patient under such circumstances to less risks would be advantageous. In intrathoracic aneurisms the Hunterian operation is impossible, and equally so in a practical sense on the abdominal aorta. Distal ligature for aneurism at the root of the neck, though many times successful, especially within recent years, involves a serious operation, often complicated by the presence of the tumor, and there are cases in which it has entirely failed in effecting a cure. For the last fifty years efforts have been directed to effect cures of aneurism by the administration of internal remedies, by the lowering of the vitality of the body by starvation, with the object of inducing marasmic thrombosis; and where these failed, as they very frequently did, attempts were made, by acting directly upon the blood-stream, to bring about coagulation. It is not intended to give a history of these methods, of which you are fully cognizant. Many of them are highly interesting in detail; all of them point towards a common end, and most have in them some elements of success. Most investigators who have endeavored to effect direct occlusion of an aneurism by the introduction of foreign bodies into its sac, ha

aimed, as far as the *rationale* of their proceeding is intelligible, at producing such an effect upon the blood-stream as to cause coagulation of the blood contained in the sac. When success attended their efforts a red thrombus resulted within a very short period. Retardation or complete cessation of the flow of the blood through the aneurism greatly facilitates the red thrombus formation, the entire mass of blood coagulating simultaneously. This is seen in popliteal aneurism when cure results from extreme flexion of the leg upon the thigh. Galvano-puncture, while producing coagulation of the blood at the positive electrode, does not arrest the flow of the blood through the vessel, and one important element in the formation of red thrombi is consequently wanting. Failure to effect a cure from galvano-puncture is, therefore, the rule. Many have preferred to stuff the cavity of an aneurism with quantities of wire, horse-hair, or catgut, which were intended to effect the double object of acting as foreign bodies, and at the same time to retard the flow of blood through the sac. Some who employed acupuncture arranged the pins with the intention of causing an obstruction to the flow of blood, and so favoring the commencement of coagulation.

Is a red thrombus formed within an aneurismal sac best suited for its ultimate occlusion, and are the means at our disposal sufficient to command the production of red thrombi in the presence of a vigorous flowing blood-stream? Let us look briefly at the various kinds of thrombi, and the manner in which thrombosis takes place. A red thrombus at an early stage consists of masses of fibrin, enclosing red corpuscles and a few white ones, the whole saturated with serum. As the fibrin contracts, this serum is exuded, the mass diminishes in bulk, and, though at the outset it may have filled the sac, thereby producing occlusion, yet, owing to this shrinking, the blood-stream may be re-established, especially when the walls of the aneurism are not collapsible. This has happened in many instances where occlusion lasted some hours, or even days, after which slight pulsation returned, and ultimately the volume of blood passing through the aneurism became as great as before the formation of the red thrombus. Shrinking continues in this form of thrombus for a considerable period, and may lead, weeks subsequent to the occlusion, to a portion of the channel becoming patent. After occlusion has been effected, the red thrombus, which is simply a mass devoid of vitality, undergoes one of several changes. The blood-clot may be acted on in the same way as it would be were it in a wound. It may be penetrated by leucocytes, which absorb the thrombus and replace it by fibrous tissue. This would be the most favorable termination for red thrombi within an aneurism, but it is seldom seen. Again, the thrombus may become converted into red or into yellow softening. The former is serious, not only from the transformation of the mass into reddish or grayish disintegrating pulp, but from the fact that some of this disintegrating material may find its way into the blood-current and give rise to emboli. Yellow softening is even worse, as here it is not a mere disintegration of the blood-clot, but an intense inflammation of the walls of the vessel, ending in pus-production, dependent, in all probability, on septic contamination. The wall of the vessel participates in the softening process; hence the blood may burst into the surrounding tissues. The blood-current may also carry portions of septic detritus into the circulation, causing septic infarctions. The latter form of softening is to be guarded against by preventing septic matter being introduced from without, and by rendering aseptic, prior to operation on the aneurism, abscess, or suppurating ear which the patient may have. White thrombi are not liable to either of these forms of softening; the first could scarcely occur in it, while the second is preventable.

The attempts to produce coagulation in aneurismal sacs by the introduction of foreign bodies into their anterior, although occasionally successful, have failed, as a rule, especially on aneurisms at the root of the neck or where the circulation could not be controlled on the proximal side of the sac. Those who have endeavored to produce red thrombi for the purpose of occluding an aneurism under these circumstances have omitted one of the most important elements, without which success cannot be secured,—namely, placing the blood in the sac in a state of rest. In intrathoracic aneurisms and those at the root of the neck the arrest of the blood-stream is an inherent impossibility, except by occlusion of the sac; and, therefore, in them this mode of treatment is not applicable. When red thrombi are formed, in the presence of a vigorous blood-stream, they are more liable to disintegration and absorption than to organization. It is in this way the red thrombus formed on the positive elec-

trode by galvanism is so often of no benefit. But why are there some successes, complete or partial, and how do these arise? It is due to these successful stray cases that a half-hearted belief in this line of treatment still lingers. In the majority of such subjected to pathological examination at various periods subsequently to the complete or partial cure, the sac has been found to contain white thrombi, which, it is assumed, resulted from organization of the red thrombi. Thus, for instance, in certain aortic aneurisms treated by galvano-puncture white thrombi have been noticed developed at the points punctured by the needles. These were attributed to the galvanism, whereas they were due to the deranged vessel wall setting up a reparative inflammatory process. This interpretation of the phenomenon receives support from the fact that white thrombi may be produced by the penetration of the vessel wall without galvanism. Let us look briefly at the characters of white thrombi.

When the current is unobstructed, white thrombi are prone to form in the interior of the vessel, at a spot where irritation has been induced, and from which the endothelium has been removed. At such a part leucocytes, derived partly from the vessel wall, but mainly by segregation from the blood-stream, become firmly adherent to the vessel. When this process has been initiated, it tends to grow by superimposed accretions, so that a parietal thrombus may proceed till complete occlusion occurs. The leucocytes shortly after their deposition disintegrate into a finely granular fibrin which shrinks, but the shrinkage is by no means so great as that which occurs in red thrombi. Where the shrinkage is completed, the white thrombus chiefly consists of an inert body capable of, aud subject to, further transformation. The various forms of softening to which red thrombi are subject seldom affect white thrombi. Were the damage to the vessel wall or surrounding structures excessive, puriform softening could occur, especially in the presence of septic matter. The latter is in the majority of cases avoidable. The white thrombus is prone to undergo replacement by vascularized fibrous tissue, the granular fibrin originally deposited becoming absorbed, and taking no share in the new formation. The first step in the process is the infiltration of the vessel wall with the leucocytes derived from the vasa-vasorum and the neighboring vessels. These penetrate the thrombus, becoming converted into formative cells, which develop into fibrous tissue abundantly supplied with blood-vessels. In this way a thoroughly vascularized connective tissue, blended with the vessel wall, is formed throughout. The vessels of this new-formed fibrous tissue are continuous with those of the vasa-vasorum.

It is possible, when in an aneurism the parietal thrombus in process of development has reached the level of the internal surface of the normal arterial tube, that it may become covered with endothelium. If so, a new channel would be formed with very thick external walls. The restoration of the lumen of the vessel, while securing the cure of the aneurism, would be an ideal result, which, however, has not yet been obtained. That the thrombus, especially after its development into fibrous tissue, could become covered by endothelium is evident; but under favorable circumstances it may even occur while the thrombus is in an earlier stage. A somewhat analogous process is sometimes seen on the surface of a wound; fibrinous exudations containing many leucocytes may become covered by a layer of epithelium, the formation of the latter keeping pace with the advance of the living infiltrating leucocytes. What occurs with epithelium may take place with endothelium under favorable conditions. Not unfrequently in the ligature of an artery the endothelium has been seen to cover the free portion of the thrombus. It is true that in aneurisms undergoing natural cure the thrombi are very slowly and imperfectly replaced by fibrous tissue. In the young the transformation of white thrombi into connective tissue takes place quicker than in the old with degenerate arteries. In some of the former the accumulation of leucocytes at the damaged wall may be so rapid and so great as to assume the appearance of granulation tissue. When there are extensive calcareous plates in the wall of the vessel or the aneurism, the formation of white thrombi is seemingly delayed, and when formed they seldom pass into a vascularized state, owing probably to the dead calcareous matter intervening between the thrombus and the vasa-vasorum. The deposition of white thrombi occurs so slowly that, in large aneurismal sacs, it is, as a rule, many months before occlusion takes place. The thinner the layer of white thrombi formed on the wall of the vessel the easier will its organization be effected; therefore the slower the process, other things being equal, the surer will organization follow in its wake. If one could so regulate the depo-

sitions as to insure organizations of one layer before the next was superimposed it would be advantageous, in cases where no urgency exists. Even in large thrombi, however, organization takes place, and may become complete. Formative cells may be found developing in white thrombi in the lower animals a few weeks after their formation. In the course of time the connective tissue which has replaced the thrombus shrinks very considerably, so that what has been a large solid tumor quickly becomes reduced to a diminutive size. It is, therefore, seen that a thrombus formed by acting on the contents of an aneurismal sac is different from one induced by acting on its walls. The introduction of foreign bodies into the sac of an aneurism in which the blood is freely circulating, with the object of forming red thrombi, is not the most certain way of producing permanent occlusion of the vessel. White thrombi are more suitable for permanent aneurismal occlusion under such circumstances.

Granting the aim to be to secure a white thrombus in an aneurismal sac, how can this be accomplished? In an elaborate paper published in the *Lancet* for November 22, 1890, DR. WM. MACEWEN shows that this may be done by irritating the wall of the aneurism in such a way as to induce infiltration of the parietes with leucocytes, and a segregation of them from the blood-stream at the point of irritation. The irritation ought to be just sufficient to set up reparative exudation, and must not exceed this. If the irritation be pushed to such an extent as to induce softening of the vessel wall, not only would the object be frustrated, but the pressure of blood from within might cause the aneurism to burst. While it is true that once the white thrombus has been formed in the interior of an aneurism it tends to grow by successive accretions, and, by starting at a small irritated point in the wall of the distended vessel, it might ultimately cause complete occlusion. Yet it is better so to act upon the wall of the aneurism as to produce either a uniform irritation over its whole surface, or to stimulate as many points in its interior as possible. In this way many foci will throw out white thrombi; at all such places the wall of the vessel is being strengthened and preserved from further dilatation. It is well, if possible, to secure foci all over the sac for another reason: were a white thrombus formed in one part of a sac alone, it might be possible for the blood-pressure to be exerted all the more on some other part of the sac not so protected, and so in the case of a very thin wall damage might result. It would be well, therefore, to ascertain, as far as possible, the form and dimensions of the aneurismal sac before inducing plastic effusion at any one part of it. This may be readily done beforehand in aneurisms of the extremities; but in those of the trunk and root of the neck it in many cases can only be ascertained by investigation within the aneurism itself. Fortunately a very fair idea may be ascertained by the very instrument which is intended to induce the cure, and at the same time as the latter is initiated. The means hitherto employed to effect this purpose have been very simple. The instrument employed is a pin of sufficient length to completely transfix the aneurism and to permit of manipulation within it. Its calibre ought to be as fine as possible, the strength being only sufficient to penetrate the coat of the aneurism and the intervening tissues. This cylindrical pin tapers to a point, like an ordinary sewing-needle, and has on its opposite extremity a somewhat rounded head. As the coats of aneurismal sacs vary in thickness, these pins must be made of various calibres, as those which may pass readily through one aneurismal sac may not pass through others with thicker walls. They ought also to be finely polished, not only to facilitate their introduction, but to help to render them aseptic.

Before performing the operation, the skin over the aneurism ought to be carefully cleansed and rendered aseptic. The aseptic pin ought then to penetrate the sac and pass through its cavity until it comes in contact with the opposite side. It ought to touch and no more. Then one of two methods may be employed,—either to move the pin over the surface of the inner wall so as to irritate its surface, or to allow the impulse of the blood-current playing on the very thin pin to effect the same object. If the wall penetrated by the pin on introduction be dense, the former method will be preferable, as the force of the blood-current produces such a feeble action on the thin pin as to be insufficient to move it to and fro, while it is firmly grasped by the dense wall. After acting thus for ten minutes at one part, the point of the pin, without being removed from the sac, ought to be shifted to another spot, and so on until the greater portion of the internal surface opposite to the point of entrance has been touched; this ought to be done in a methodical manner. A single insertion of

the pin through the aneurismal sac into its interior may be sufficient to enable the point of the instrument to come into contact with the greater part of its internal surface, but in some cases puncture from various sides of the external wall may be necessary so as to reach portions of the tumor which cannot be attacked from the first puncture. While the pin is in the aneurism it is surrounded by a portion of aseptic gauze, or moistened with an antiseptic solution. When it is withdrawn from the aneurism, the part ought to be covered with moist antiseptic dressing, preferably a watery solution of carbolic acid, which ought to be maintained for several days. The period a pin may remain in an aneurismal sac without doing damage is perhaps dependent on the individual and the state of the aneurism, but it ought never to exceed forty-eight hours. It is questionable whether all the necessary advantages derivable from the irritation of the wall of the aneurism could not be produced within a few hours. No doubt their retention for twenty-four or thirty-six hours *seems* to produce a greater effect. If the aneurism be very large, several pins may be introduced from various points, always allowing a considerable interval to exist between each, otherwise there might be too much damage to the vessel wall at one spot. In some instances the point of the pin has been engaged in the opposite wall of the aneurism, and it has thus produced sufficient irritation. It need scarcely be said that the general health of the individual and the condition of the aneurism and of the surrounding tissues ought to be carefully examined before commencing the treatment. If there be anything wrong which could be put right before operating, that ought to be done. No one would think, for instance, of introducing pins into an aneurism that was inflamed or where the tissues in the vicinity of the aneurism were in a state of erysipelas. It would also be necessary to render aseptic any sore in other parts of the body which the patient had. When the pin has been withdrawn, though there may be a little thickening of the tissues in the neighborhood, there will probably be little or no diminution of the eccentric impulse. Occasionally it may be weeks before any distinct or tangible thickening of the coats can be made out. In other instances this may be discernible at a much earlier period. But, as a rule, a distinct thickening of the coats of the vessel is tangible at an early period. It has occasionally happened that some weeks after the first introduction of the pins, the walls, though thickened, appeared to be so only to a slight extent; whereas, when a second puncture of the sac was made, a much stouter pin was required to penetrate the coats than the one which on the first occasion slipped easily through the walls of the aneurism, showing that there was a greater thickening than was indicated by external palpation. Further, in one instance, had the amount of dense fibrous tissue within the aneurism been rightly appreciated, it is probable that a death from suffocation would not have been permitted, at least without an endeavor being made to save the individual by operative means. It is also to be borne in mind, especially in deep-seated aneurisms, that the thickening appreciable on the external surface of the sac through which a pin has passed is much less, as a rule, than that on the part of the sac acted upon by the points of the pins, and therefore the one farthest away from the point of entrance, and which cannot be reached by manipulation. Thus irritation of the coats of the aneurism has been in some of my cases many times repeated at intervals of weeks, and in one case of months, with the view of hastening the consummation of the cure. Though there was apparent advantage after each, it is doubtful whether the formation of white thrombi was not going slowly on independent of this interference. It is clear the coats of the aneurism cannot be reached by the pin after they have been covered by a thick layer of white thrombi; the extremity of the pin must, therefore, come in contact with the dead thrombi alone. Were the previous layer of thrombus vascularized, then the secondary introduction of the pin would be of service in coming into contact with living tissue, and setting up in it fresh irritation and fresh deposition of white thrombi.

In introducing pins, care ought to be taken to avoid injuring important structures which may be overlying the sac. The cords of the brachial plexus may be raised by aneurism at the root of the neck; it would be necessary, in order to prevent pain, to insert the pins apart from them. Where the aneurism is inaccessible from without, this mode of treatment could not be applied, but most of the aneurisms of the chest whose physical features can be determined, and whose limits are clearly defined, may be subjected to this form of treatment. When a sac is covered by calcareous depositions, it is possible that these may exercise a deterrent influence in the production of thoroughly-organized connective tissue

forming in the thrombus. The younger the patient, other things being equal, the quicker would the white thrombus form. Suppose complete consolidation may not be effected from the treatment, the thickening of the coats of the aneurism may prolong life, especially if it be uniform. Though this method has been adopted of producing the necessary effect upon the wall of the sac, any other mode of carrying out the principle of the treatment, the occlusion of the sac by the formation of white thrombi, and its consequent organization into living tissue, might be used, provided it showed any advantage. One would be inclined by preference to use any means which, while being equally successful and easily applied, would do away with the necessity of penetrating the sac.

Dr. Macewen reports four cases of aneurism treated by this method. The first was that of aortic aneurism, which was seen at an advanced period when death was threatened by dyspnœa, in which this method of treatment was employed, but too late to prove of value, since death occurred within a month from fatal dyspnœa..

In the second case, that of aneurism of the upper part of the right femoral, involving the external iliac artery, which measured five inches in diameter, the aneurism was completely cured by the induction of white thrombi within the sac, and a post-mortem, being possible from the patient's death fifteen months later from carcinoma of the tongue, permitted of a verification of this fact. This aneurism was entirely obliterated, its place having been taken by a reddened tissue.

The third case was that of an abdominal aorta, treated by induction of white thrombi in interior of vessel. The treatment was only persisted in for a month, from the fact that the patient at that time felt so much relieved that he determined to resume work. The tumor was not at that time entirely consolidated, but after two and a half years he was still living and comparatively well.

The fourth case was of intrathoracic aneurism, probably of the left subclavian, accompanied by great swelling, pain, numbness, and loss of power in the left arm, treated by induction of white thrombi within the sac, which resulted in complete consolidation of the aneurism and restoration of function of arm.

These cases thus show that white thrombi may be introduced by direct local action. Dr. Macewen cautions, however, in the strongest terms, against the indiscriminate employment of this treatment upon every case of large aneurism, especially upon those which are beyond hope, as only in such cases can discredit attach to its employment. The very simplicity of the treatment, the facility with which it may be carried out, without even the use of an anæsthetic, and the comparatively limited anatomical knowledge required, make this word of caution necessary. Further, where it is employed, care must be taken to have the pin entirely aseptic, for while the introduction of an antiseptic steel pin into the sac could rarely be productive of harm, disasters might readily result from the introduction of a pin carrying septic matter with it. It is well, however, that the fact is established that white thrombi may be induced simply by the direct local action, without any aid from other directions. No doubt some cases will be found more suitable for this form of treatment than others; some in which the white thrombi will form more readily and some more slowly, and possibly others in which it will not take place. Future experience will decide. I trust that this form of treatment will not be indiscriminately employed upon every case of large aneurism, especially upon those which are beyond hope, otherwise the method will be discredited. The very simplicity of the treatment, the facility with which it may be carried out, without even the use of an anæsthetic, and with a comparatively limited anatomical knowledge, make this word of caution necessary. The cases of uncomplicated aneurism must be few in which the introduction of an aseptic steel pin into its sac would be productive of harm. Disastrous results would easily follow the introduction of a pin carrying septic matter with it.

In conclusion, whether this precise method of inducing white thrombi within the sac be accepted matters little, if we accept the fact that every aneurism contains within itself a potential cure. We have only to devise methods of calling it forth.

SALINAPHTHOL.

This body is a combination of salicylic acid with naphthol, and is thus analogous to salol, which is a combination of the same acid with phenol. It has no odor, nor taste, and is insoluble in water, and is claimed to act equally well to salol in acute articular rheumatism, while it is tolerated in the dose

of 4½ to 7½ grains repeated four times daily, producing no headache nor any symptoms of poisoning. Under prolonged use Kobert believes that, as a result of the action of the pancreatic juice and the intestinal ferments, it is split up into salicylic acid in the urine.

DR. LÉPINE (*Journal de Médecine de Paris*, November 16, 1890) denies that the intestinal juice is capable of producing this decomposition, though he admits that it may be produced by the pancreatic juice. He does not, however, seem certain as to whether the decomposition is not attributable simply to an alkaline reaction, as it may be produced within the blood. Nevertheless, testimony appears to show that salinaphthol is less toxic than salol, from the fact that the naphthol resulting from its decomposition is less poisonous than the phenol which results from the decomposition of salol.

As yet, however, the clinical data are insufficient to establish the therapeutic value of this medicament.

TREATMENT OF "COLDS" BY SODIUM SALICYLATE.

In a recent number of the *Memphis Medical Journal* the claim is made that salicylate of sodium is as equally efficacious in the treatment of bad colds as it is in tonsillitis. A prescription of half an ounce of salicylate of sodium with half an ounce of syrup of orange peel, and enough mint-water to make four ounces, is recommended in the dose of a dessertspoonful every three or four hours, until the specific action of the salicylate—that is, ringing in the ears—is produced. It is claimed that aching in the brow, the eyes, and the nose, together with the sneezing and the nasal discharge, will then cease, and will entirely disappear in a few days, not leaving, as is usually the case, cough from the extension of the inflammation to the bronchial tubes.

CHEMICAL ANALYSIS OF KOCH'S REMEDY FOR TUBERCULOSIS.

According to the Vienna correspondent to the *Lancet* for November 29, 1890, a small quantity of Koch's remedy provided by PROFESSOR SCHNITZLER has been subjected to a preliminary chemical examination at the private laboratory of Dr. Jolles, and the following results have been obtained: It is a syrupy, slightly-foaming liquid of brown color, its aqueous solutions showing a greenish fluorescence. In odor it resembles elder yeast or leaven combined with a sweet aromatic admixture such as honey. If slowly heated, the smell of yeast gives way to an agreeable odor resembling fruits; on further heating, the smell becomes like that of fresh bread-crust, but without the acid character of fruit. If the heating of the substance is continued, the smell assumes the empyreumatic character of that exhibited by burning albuminous matter and carbonizing horny substances. Only an extremely small quantity of ash (under one per cent.) was obtained. The liquid shows a neutral reaction. Some of the liquid was diluted with water and subjected to various tests. By adding diluted acetic acid it becomes slightly opaque, by which the presence of a small quantity of mucin is indicated; by further adding potassium ferrocyanide the opacity of the liquid is increased, showing the presence of albumen; but this reaction is too feeble to indicate the amount of the active principles in the lymph. On the other hand, the biuret reaction characteristic of peptones is very strongly marked. The tests for cyanogen compounds gave perfectly negative results, and the assumption that Koch has been using cyanides of gold or prussic acid seems, therefore, completely erroneous, as no metals could be detected in the liquid. Traces of reduction were observed after treating the liquid with Fehling's solution, but the presence of sugar among the reducing substances could not be confirmed. Sulphur and phosphorus in an organic form proved to be absent. As only a small quantity of the lymph could be used for chemical examination, it was impossible to shake the liquid with ether and alcohol for the purpose of separating the alkaloids, if present, from the albuminoids, but the reagents which reveal the presence of alkaloids and ptomaïnes, even when mixed with albuminoids,—*e.g.*, acid bichromate of potassium,—failed to give a reaction, so that the absence of alkaloids and ptomaïnes may be taken for granted. It seems, therefore, that, besides the peptones, the principal active substances contained in Koch's lymph belong to that not yet chemically-defined class of the protein bodies called toxalbumens, globulins, or enzymes, which play such an important *rôle* in all fermentative processes, from the chemical changes produced by common yeast in the products of the vegetable kingdom up to the coagulation of the blood in animals.

TRIALS OF KOCH'S LIQUID ABROAD, AND OPINIONS OF THE MEDICAL PRESS.

In France the reception of Professor Koch's discovery by the medical press has been fairly cordial. Some journals, as the *Gazette Médicale de Paris* and the *Progrès Médical*, are content with giving abstracts of the recently-published reports from Berlin, the last named expressing surprise at the moderate and somewhat vague terms in which the action of the remedy is now being spoken of, compared with the more enthusiastic language first held. *L'Union Médicale* (November 27, 29, and December 2) has followed carefully the progress of events. It points out that more caution is being used in its employment, especially in view of its liability to induce acute pulmonary œdema in lung tuberculosis, or œdema of the brain in meningeal cases, or of the glottis in laryngeal, etc. Surgical cases are more amenable to treatment because of the readiness with which the diseased parts can be completely extirpated after the remedy has exerted its necrotizing effect. It refers to Von Ziemssen's opinion that lung cases will require prolonged treatment. M. Villaret, writing from Berlin to the *Semaine Médicale*, insists on there being a certain idiosyncrasy in the extent to which the injections are borne, and cites three cases treated by the same doses, in one of which a typical reaction took place after fifteen hours, in a second an "atypical" one after three hours, and in the third a weak but typical reaction after ten hours. *L'Union Médicale* thinks that we are still much in the dark, and points to the fact that relapses have already occurred in lupus cases: it is an error to believe that we are at all near proofs of its real therapeutic efficacy. At the Laennec Hospital, on November 30, MM. Cornil and Chantemesse inoculated six patients, two being cases of lupus, two of early pulmonary tuberculosis, and two of surgical tubercular affections. In one of the lupus cases, a young man of 18 years, .002 c.c. was injected, and reaction began five hours after, the temperature reaching its maximum in twelve hours (39.2° C. from 37.2°). The appearances were precisely similar to those described by all who have tried the remedy in lupus. There was an equally marked reaction (maximum temperature 39.4° C.) in a case of early phthisis, with headache and nausea, and slight auscultatory changes attributed to congestion. M. Pean, on the 29th, inoculated several cases at St. Louis Hospital. He expressed the opinion that Koch was justified in withholding the nature of the remedy at present, and insisted on the danger of incautious administration. Dr. Moreau, of Algiers, asserts that in some well-marked tubercular cases no reaction has followed injection, and that in some non-tubercular subjects reaction has been observed. In one case of Leyden's the fever set up by the injections continued after these were discontinued. *La Province Médicale* (November 29) thinks that enthusiasm is giving way to uncertainty, and avers that in pulmonary cases its action is very limited, and that, although it may cause diminution in expectoration of bacilli and in night-sweats, its use is not followed by any gain in weight or strength. Much is required to be known concerning the length of time that such cases have to be treated. The *Gazette des Hôpitaux de Toulouse* defends Koch for his reticence, since he was forced to publish his results prematurely. It says that in showing that the "lymph" has an elective affinity for tubercular tissue, his researches are to be greatly praised. It raises the question as to the desirability of "curing" the phthisical. The *Allg. Wiener Med. Zeitung* (November 25) devotes much space to contributions on the subject, including one by Dr. Buchner, of Munich, who points out that inflammatory action may play the chief part in the destructive process. The *St. Petersburger Med. Wochenschr.*, No. 46, November 17 (29), states that on November 11 (23) Professor Anrep gave an address on the subject, and inoculated three lupus cases with some of the "lymph" given him by Professor Koch. Other delegates have also gone to Berlin, and many physicians from all parts of Russia. The remedy has also been used in Professor Baccelli's clinic at Rome.—*Lancet*, December 6, 1890.

AN EARLY SIGN OF UTERINE CANCER.

In a paper published by Dr. Charles Audry in the *Lyon Médicale* for November 23, 1890, it is claimed that in doubtful cases of uterine inflammation, especially when confined to the neck or cervical cavity of the uterus, and in which a diagnosis can ordinarily only be made as the result of microscopical examination of excised fragments, in every case in which fragments of tissue may be scratched off from the cervical cavity by the finger-nail the epitheliomatous nature of the disease may be positively affirmed. In

chronic metritis the tissues to the touch appear sometimes hard and sometimes soft, but in no case is it possible to scratch off fragments of the mucous coat by means of the finger-nail, with the single exception of cancer. Further, the author claims that there is no form of epithelioma in this cavity from which fragments may not be so removed. This process is evidently simple, and, if confirmed by others, will be of great value in clinical practice.

PHYSIOLOGICAL ACTION OF THIALDINE.

Thialdine, obtained for the first time by Woehler and Liebig, in the form of large crystals, of aromatic odor, which volatilize at the ordinary temperature without decomposing, is but slightly soluble in water, dissolves rapidly in alcohol and acids. According to *Les Nouveaux Remèdes* for November 8, 1890, from experiments made with this substance the following conclusions were reached:

1. Thialdine is very poisonous in frogs in the dose of ⅓ grain for every one hundred and fifty grains body-weight, though much less poisonous in rabbits.

2. Its administration is followed in the frog by profound sleep, with loss of general and reflex sensibility, depressed sensibility of the motor nerves, while the muscular irritability remains intact. In the rabbit the anæsthesia is less intense, and interrupted by excitation.

3. Thialdine invariably causes slowing of the pulsations of the heart, which, nevertheless remain perfectly regular. It is only when given in very large doses, and then only immediately before death, that the pulsations of the heart become irregular.

4. When given in small doses, the slowing of the pulse is only transient. Injected in small doses in the excised heart, thialdine diminishes the number of pulsations, at first prolonging the diastole, after rendering the contractions of the heart irregular and more rapid, and finally arresting the heart in diastole.

5. In large doses it slows at the outset cardiac contractions, and then leads to the arrest of the heart in diastole.

It would thus seem that carbothialdine and thialdine differ absolutely from each other as regards their physiological action. The first is an energetic tetanizer, and never produces irregularity of the heart, which it arrests in diastole. On the other hand, thialdine produces irregularity of the heart, which, in the majority of cases, it arrests in systole; finally, while carbothialdine produces no effect on rabbits, thialdine is poisonous in them, though to a less degree than in frogs.

THE PHYSIOLOGICAL ACTION OF SULPHALDEHYDE.

Sulphaldehyde, produced by the action of sulphuretted hydrogen on ethylic aldehyde, occurs in the form of an oleaginous liquid of a repulsive odor, solidifying slightly below the freezing-point. Treated by acids, sulphaldehyde is transformed into a solid, the point of fusion of the various articles of commerce varying in accordance with their greater or less purity. Its analogy in composition to paraldehyde led Dr. Lusini to test the physiological action of the sulphaldehyde, administering it by injections intraperitoneally, and into the stomach of rabbits and frogs (*Les Nouveaux Remèdes*, November 8, 1890).

It appears that sulphaldehyde produces profound and tranquil sleep without any phenomena of excitation. On account of its insolubility, some time is required before its effects follow its administration; nevertheless, it is claimed to be much more energetic than paraldehyde. It is eliminated completely by the urine, to which it gives its characteristic odor.

PRACTICAL HINTS ON STERILIZING MILK.

At the meeting of the New York Academy of Medicine, held November 13, 1890, Dr. Walter Mendelson read a paper, which contained many practical hints of value on the different processes of sterilizing milk (*New York Medical Journal*, December 13, 1890). He said that much of the confusion and dissatisfaction of the laity in preparing sterilized milk was due to the fact that the theoretical principles upon which they must work had never been simply and fully explained to them. He thought that it was not only the physician's duty to let the one upon whom the preparation devolved know the means, but the object as well. Explain to her or him that investigation had shown that not only were the curdling, souring, and other obvious changes due to the growth of bacteria or minute germs in the milk, but also that various dyspeptic and diarrhœal

diseases of bottle-fed children were caused by the presence in the milk of similar minute organisms which might produce no change in the milk itself. Tell them that it had been found that, when milk had been heated to the boiling-point, and kept there for some time, both the plants and their seeds were killed and the milk was thus rendered fit for food. After having explained that the object was to prepare a food free from germs, the next thing was to show how to accomplish this. The milk, or suitable mixture of milk, water, cream, and sugar, should be prepared as early in the morning as possible, before the heat of the day had caused the bacteria to multiply. Great care must be taken in cleansing the bottles and nipples, and for this purpose "pearline" seemed to answer the best, using it with hot water and a bottle-brush. The same bottle should never be used the second time without washing. With regard to stoppers, the best consisted of a plug made of ordinary cotton batting, folded into a pretty firm wad, and pushed down for half an inch or more into the neck of the bottle. The nipple should be a plain, conical, pure gum one, with no constrictions in it, so that it could readily be turned inside out for cleansing. When not in use it should be scrubbed clean and placed in a glass of water to which a teaspoonful of borax had been added. As for the sterilizer, any apparatus would do that would answer the purpose of keeping the milk for about an hour at the temperature of boiling. But of the specially devised affairs for this purpose, "Arnold's steam sterilizer" was the most ingenious and at the same time simple. The sterilizing of milk had marked a great advance in our methods of infant-feeding, and, as the triumphs of medicine in the future would seem to lie in the direction of preventing illness rather than of curing it, it should be the pride and interest of every physician to popularize the method under discussion, for it had already done much to lessen the morbidity and mortality among infants.

THE NATURE OF DR. KOCH'S LIQUID.

We may reasonably expect that within a very short time the profession will be placed in possession of such details concerning the nature of the material discovered by Professor Koch to have so powerful an effect upon tubercular tissues as may set at rest the "secret remedy" question. This at least may be gathered from the important statement made on the 29th ult. by Herr von Gossler in the Lower House of the Prussian Diet. It has seemed to us no compliment to Professor Koch to regard the result of his scientific investigations in the same light as other so-called "cures" and quack remedies, but at the same time we have felt that there could be no possible harm accrue from such an exposition of his researches as might satisfy the most delicate scruples. Nay, we believe that no difficulties will be placed in the way of competent bacteriologists being instructed in the methods in Professor Koch's laboratory. What, however, is essential, in the interest of medical science and of the tubercular patients themselves, is that the material, wherever made, should be thoroughly tested as to its reliability before being placed in the hands of practitioners. A fortnight since we ventured to suggest as a feasible plan to meet this requirement, that each specimen of liquid wherever prepared should be certified by a central and responsible authority. The Prussian minister hinted that the state would undertake this responsibility, in the following declaration. He said, "A feeling of satisfaction will be experienced throughout the world if Prussia sets her stamp upon the lymph, but a guarantee must be given that there is no question of financial or other subsidiary considerations. The government would eventually invite other nations to send representatives to study the remedy and make it known in their respective countries." We can endorse this satisfaction, and accept the assurance that nothing of a commercial speculation will be made of the remedy. That five grammes of the fluid, sufficient for five thousand injections, should cost twenty-five marks is not surprising, and, indeed, it shows that it is, *quo ad* its alleged effects, perhaps the cheapest drug ever placed in the market. It is noteworthy that secret remedies are nowhere so sternly discountenanced as in Prussia. Moreover, we learn that on the left bank of the Rhine, where the Code Napoléon is still in force, it is absolutely illegal to use any remedy the composition of which is unknown, and even a newspaper writing in favor of it is liable to a fine. Finally, we would call attention to the subjoined statement made by the Vienna correspondent of *The Times* of the 3d inst.:

"The Vienna Board of Health has passed the following resolutions: The inoculation of out-patients with Dr. Koch's lymph is not to be permitted for the present. Every case of

inoculation is to be notified to the authorities, and both physician and patient are to be closely watched. The origin of the lymph must be exactly described in each instance. An order from the Minister of the Interior, based on these resolutions, will be immediately published."

The need for such stringent surveillance is, we regret to learn, due to the doubtful character of the practice which has arisen in that city. Apart from this, the highly dangerous nature of the remedy must necessitate the greatest caution in its employment. —*Lancet*, December 6, 1890.

CHRONIC CONSTIPATION.

According to the *Medical Press and Circular* for November 12, 1890, at the meeting of the Berlin Medical Society, HERR FLATAU introduced a new method of treating cases of chronic constipation due to torpor of the colon. This consists in applying about 3 grammes of boric acid. In those cases in which the lower edge of the rectum protrudes through the anus, and when this remains visible after powerful contractions of the levator ani and sphincters, the quantity of boric acid mentioned is either to be dusted on or rubbed on the mucous membrane in sight. In cases in which the mucous membrane is not visible it must be insufflated. It is important that the medical attendant should carry out the procedure himself, at any rate, at the commencement. The patient should then keep quiet for a time. In from an hour to three hours peristaltic action will be observed in the colon. He has never seen a failure from this method of treatment, nor had he seen a case where the patient got so accustomed to it that it ceased to be effective. On the contrary, if carried out systematically daily, permanent improvement in time takes place, and normal peristalsis is returned to. He had tried a number of other substances, but none had the same useful effect.

THE RELATION OF ASTHMA TO OTHER DISEASES.

At the meeting of the Medical Society of London, held November 10, 1890, DR. S. WEST read a paper upon "The Relation of Asthma to other Diseases," of which the following is a brief abstract (*Lancet*, November 22, 1890): The author intended his communication rather as a review of the subject, to serve as an introduction to discussion, than as a statement of his own views. He used the term "asthma" in the strictest sense of the word, and he gave a full definition of it, which was practically a short description of the disease. He then discussed its relation to various other lesions. He held that asthma stood in no relation to affections of the lungs, other than to emphysema and chronic bronchitis. He pointed out that it usually disappeared in patients who became affected with phthisis, and related two cases in illustration of this. With regard to affections of the heart, dyspnœa was often seen in connection with them, and paroxysms were not rare, but these cases of paroxysmal hurry differed entirely from true asthmatic paroxysms. True cardiac asthma was extremely rare and was most difficult to treat; it had no connection with angina pectoris. Referring to the relation of asthma to diseases of the stomach, he held that the cause of the asthma was not due to irritation of the gastric mucous membrane itself, but to the absorption and circulation in the blood of some product of an irritant nature. Cases of so-called "asthma verminosum" probably were similarly explicable. Dyspnœa was common in affections of the kidney, but true asthma was very rare. In uræmic conditions, respiratory disturbances were common, but they more nearly resembled those seen in diabetic dyspnœa. Illustrations of the occurrence of asthma in association with gout and lead-poisoning were then given. The connection of asthma with certain affections of the nose was first established in 1872, and it seemed to be proved that reflex neuroses sometimes arose in connection with such lesions as polypus, chronic rhinitis, paroxysmal sneezing, etc. The subject had been approached in two ways,—a series of cases of asthma having been taken and the occurrence of nasal affection noted, and then a series of nasal affections in which asthma had been present. The result of analysis of these groups showed that there was some slight connection between the two, but that it was by no means constant. In some cases, however, the connection seemed exceptionally strong, instances being quoted where the growth of nasal polypi was associated with the onset of asthma, which latter disappeared upon the removal of the growths. He regarded hay-asthma as a variety of the true affection, and he pointed out that the association of asthma with pharyngeal disease was very rare. Many affections of the neck and mediastinum were met with in which

asthma occurred, but it was impossible to dissociate here the effects of pressure. A great deal had been written as to the association of asthma with diseases of the skin, but it appeared on the whole that this was only accidental, or both, perhaps, were the joint effects of a common cause. Urticaria was most frequent, then eczema, herpes, some of the exanthemata, psoriasis, syphilis, drug eruptions, acne, etc. He thought that a sufficient number of cases of asthma in association with cerebral affections had been recorded to make it more than a coincidence. It had been observed, though rarely, to alternate with insanity and with hysteria. The exciting causes were very many; for, like epilepsy, it appeared to depend on an unstable condition of the nerve-centres, and explosions could, therefore, be excited reflexly by a number of causes. He adopted the hypothesis that there was an asthma centre in the medulla, which could be acted on from above by emotion, various psychoses, epilepsy, and some cerebral lesions; in the centre itself by uræmia and dyspepsia; from below, by disturbance of the special senses, such as of the olfactory and optic nerves, by stimulation of the nerves of common sensation, as of the fifth in the face, and by cutaneous irritant rashes. It could be acted on also by the branches of the pneumogastric distributed to the neck, thorax, heart, lungs, and stomach, and by the sympathetic through its branches from the intestines, kidney, and uterus. It affected many sets of muscles other than those proper to the bronchi, and therefore could only be of central origin. In conclusion, he regarded asthma as a reflex neurosis, producing spasm of the bronchi and of the diaphragm, associated with bronchial vasomotor disturbance, and an unstable condition of the respiratory centre. It so closely resembled epilepsy that Hughlings Jackson had defined it as a "respiratory convulsion."

TREATMENT OF ENURESIS.

Dr. Kupke, of Posen, in a paper published in the *Allgemeine Medicinische Central-Zeitung*, gives his views on the treatment of incontinence of urine (*Lancet*, November 22, 1890). He considers the cause to be either diminished activity of the vesico-spinal centre in the lumbar part of the cord, or partial anæsthesia of the sensory nerves of the bladder, both of these conditions preventing prompt information being conveyed to the cortex of the cerebrum when the bladder is becoming full. In cases where deep sleep occasions the brain to lose control over the bladder, it is well to keep a light burning in the room, so as to lessen the depth of the sleep. After calling attention to a number of well-recognized causes of enuresis, such as phimosis, intestinal worms, etc., Dr. Kupke mentions Guyon's and Unverricht's methods of galvanizing the parts, the former, by means of a urethral electrode, the latter by means of a large stationary positive electrode applied to the lumbar region and a small negative electrode moved from place to place over the pubes. He himself, however, prefers faradization, combined with medicinal treatment. The former is applied by means of a large, flat, stationary, positive electrode over the last dorsal and first lumbar vertebræ, while a small positive electrode is applied with stroking movements over the region of the bladder. The most valuable drug is one which is but little known in this country,—the sweet sumach (*Rhus aromatica*). The preparation he employs is the extractum fluidum rhois aromaticæ, of which from 5 to 15 drops are given night and morning in a little milk, according to the age of the child. Treatment must in many cases be persevered in for three or four months in order to obtain a lasting cure. The well-known regimen as to fluids at night, a hard mattress, baths, etc., must of course be attended to. Strychnine, which used to be given before *Rhus aromatica* was adopted, is best administered hypodermically,—1 milligramme of the nitrate daily. Tincture of nux vomica is unsuitable.

THE ABSORPTION OF DRUGS IN THE FORM OF OINTMENTS.

According to some researches by Luff, published in the *Répertoire de Pharmacie*, certain drugs used in the form of ointments are most readily absorbed when the excipient is vaseline. Lanolin, he shows, would be the best excipient when a local action of a drug is more especially required, on account of the non-absorption which takes place. The experiments were made with iodide of potassium, carbolic acid, and resorcin, mixed with vaseline, lard, or lanolin; the mixture, contained in a sheep's bladder, was placed in a vessel of water, which was maintained at an equable temperature of 36.6°. The water was examined at short intervals in order to test the presence of the drugs. The exosmosis began in the case of the iodide of potas-

sium with vaseline after one hour, with lard after nine hours; in the case of the carbolic acid with vaseline after two hours and a half, with lard after seven hours; in the case of the resorcin with vaseline after ten hours, with lard after fifteen hours. No exosmosis took place in the case of either of the reagents where lanolin was used,—within a period of twenty-four hours.—*Medical Press and Circular*, December 10, 1890.

THE LOCAL TREATMENT OF ENLARGED SPLEEN.

MOSLER contributes an article on this subject in the *Wiener Medizinische Wochenschrift*, 1890, vol. i. p. 3. He commences by drawing attention to the dangers of operative interference in cases of enlarged spleen, and states as the results of his experience that the hemorrhagic diathesis is often associated with an enlarged spleen, which naturally renders the operation of extraction an exceedingly dangerous one, and what adds considerably to the risk is that the tendency to hemorrhage often remains latent in such cases. In addition to this danger, there is another more probable and serious one,—namely, that the lymphatic glands on other parts of the body may already be affected, in which case splenotomy may only hasten the general disease. Mosler has, therefore, for some time tried other local remedies rather than extirpation. He first used parenchymatous injections of a two per cent. solution of carbolic acid, and later injections of Fowler's solution. With the latter he obtained good results in a patient with an enlarged spleen, the result of malarial fever. Mosler also employed Hamond's method of injection of ergot, and also Jager's processes,—simple puncture, electro-puncture, and injections of sclerotic acid. In Jager's case death followed a few hours after the injections of the sclerotic acid. In spite of fourteen punctures and four electro-punctures, no trace of hemorrhage was found in the parenchyma of the spleen. One fatal case which Mosler had caused him to frame the following rules for the injection of drugs: 1. Only enlarged spleens of firm consistence are suitable, provided these are not accompanied by an extreme degree of anæmia, or by evidences of the hemorrhagic diathesis. 2. Before the injections a prolonged use of drugs is necessary (these drugs are not mentioned by name), in order to act upon the contractile elements of the spleen, and so diminish the amount of blood in the organ, and, as far as possible, to render narrower the lumen of the vessels; the application of an ice-bag over the spleen is especially useful a few hours after and before the injection. 3. Fowler's solution is the most satisfactory drug to inject. Mosler states that he has recently had very good results following on the injections in enlarged leucæmic spleens. In one or two cases in which the disease proved fatal there was shown to be considerable thickening and constriction of the capsule, and Mosler is of opinion that this contraction has a favorable result not only by producing a general lessening in size of the spleen, but also by checking the leucæmic process, thus considerably improving the prognosis.—*Lancet*, November 8, 1890.

THE CHOLAGOGUE ACTION OF OLIVE OIL COMPARED WITH THE ACTION OF OTHER CHOLAGOGUES.

S. ROSENBERG has performed a series of physiological experiments upon dogs with gall-bladder fistulæ, with the view of determining the conditions necessary to the secretion of bile under various general circumstances. He finds it noteworthy that the animals emaciate considerably in the early stage of the experiment,—*i.e.*, immediately after establishment of the fistula,—and that rolling and gurgling in the intestine, discharge of offensive flatus, and other symptoms, all of which are well known to appear in connection with fistulæ, at once supervened; but that after lapse of some time they fared well on a diet of rice and horse flesh.

The first experiments endeavored to demonstrate the secretion of bile in starvation and during digestion. After a twenty-four-hour fast the amount of bile, both the solid and fluid constituents, increases at those periods of the day which correspond to meal-times or the hours of taking cholagogue substances; at other periods it diminishes. Stimulated by the presence of food, the secretion of bile increases greatly; already during the first hour of the digestion process it is pronounced, while in the second hour it reaches the maximum; at this stage its consistence is less.

Rosenberg furthermore determined the cholagogue action of olive oil, sodium salicylate, Durand's mixture (ol. terebinth., p. i; sulphuric ether, pp. iii), plain water, and the artificial Carlsbad salts.

Olive oil is a powerful cholagogue when

given in large doses; sodium salicylate has the same property but to a much less degree; large quantities of water, either by the mouth or injected into the rectum, cause a temporary rapidly evanescent biliary increase. Durand's mixture of the above formula is not proven to be a cholagogue, though ol. terebinth. alone is. Carlsbad salts, whether taken in concentrated or dilute solution, lessens the physiological action of the liver.—*Pittsburg Medical Review*, November, 1890.

MANIPULATION OF THE NASAL MUCOUS MEMBRANE.

DR. VON CEDERSCHIÖLD has for some years employed a kind of manipulation, which he considers is of the nature of massage, in various affections of the nasal and pharyngeal mucous membrane. He first tried this kind of treatment on himself while suffering from chronic pharyngeal catarrh following diphtheria, and since then has had opportunities of using it on about a hundred cases in Stockholm. The instrument for the nares consists of a double spiral of silver wire about five inches in length, provided with a small wooden handle at one end and a loop or eye at the other. This loop serves to fasten one end of a strip of batiste,—a material of which infant's frocks are made,—which is wound round the spiral so as to cover it completely before the process is commenced. The instrument is gently introduced into the nostril, and moved to and fro. For the pharynx a sponge-holder is used, carrying a pledget of cotton-wool, which, as well as the metal parts, is carefully covered over with batiste. Gentle but rapid friction movements are made with this over the mucous membrane of the pharynx or naso-pharyngeal space. Not content with manipulating these regions, Dr. von Cederschiöld has actually invaded the interior of the Eustachian tube. For this purpose he employs a spiral similar to that used for the nares, but much finer,—fine enough, that is to say, to be introduced into the tube through an ordinary Eustachian catheter.—*Lancet*, November 15, 1890.

THE EMPYREUMATIC TINCTURE OF NICOTINE IN DIPHTHERIA.

Struck by the coincidence that inveterate users of tobacco seem to be especially exempt from infectious diseases, DR. SCHWITZER (*Centralblatt für die Gesammte Therape*, December, 1890) was led to test the effects of the preparation obtained from tobacco in the treatment of diphtheria, and he claims that his results have been sufficiently favorable and satisfactory to deserve notice. The fluid that he used was prepared from the tobacco residue remaining in pipes after ashes had been removed, and which was so moist as to be incapable of burning, or, still better, the empyreumatic oily substance which after prolonged use collects within the interior of pipe-stems; 2 to 2½ parts of this substance were digested in 35 to 40 parts of alcohol and then, after standing twenty-four hours, filtered, the filtrate being clear and reddish-brown in color.

Dr. Schwitzer writes that he has employed this tincture for the last eight months in 60 cases of diphtheria in children as a local application by means of a camel's-hair pencil to the throat, and the results, he claims, are so satisfactory that he was only in rare instances compelled to use any internal remedy; that shortly after painting the throat the fever was greatly reduced. The applications are not painful, and no symptoms of poisoning from the remedy were ever observed. Of the 60 cases so treated, 7 died, of which, 3 deaths were attributable to complications. As an accessory he employs a gargle made up of infusion of tobacco-leaves 2 parts to 200 of water.

Reviews.

ATLAS OF VENEREAL AND SKIN-DISEASES. By Prince A. Morrow, A.M., M.D., Clinical Professor of Venereal Diseases in the University of the City of New York, etc.
New York: William Wood & Co., 1889.

Of the last two fasciculi now before us, Part XIV. contains five plates, presenting ten illustrations,—lupus erythematosus, lupus vulgaris, lupus papillaris, tuberculosis, papillomatosa cutis, sarcoma of the trunk, sarcoma of the face, epithelioma, rodent ulcer, macular and tubercular leprosy. Of these, all of which, with one or two exceptions, are faithful representations, special mention may be made of the illustrations of leprosy, lupus vulgaris, sarcoma, and rodent ulcer. It seems to be difficult, judging by the example in this and other atlases, to present a clean-cut picture of lupus erythematosus, and yet, clinically, the disease is usually well defined and with positive characteristics. Part XV. presents illustrations of scabies, pediculosis cor-

poris, chromophytosis, trichophytosis, eczema marginatum, and favus. The picture of scabies, while not an uncommon clinical picture, is not the most usual one, and a better plate could have been selected. On the contrary, the representation of pediculosis corporis is admirable. The same good opinion may be expressed as to the illustration of eczema marginatum.

These two numbers, we believe, complete the atlas. Briefly reviewing the work as a whole, it gives us pleasure to say that the first favorable impression made by an inspection of the earliest fasciculi has been maintained and strengthened as the new parts have appeared. A publication of this kind, monumental in its labor as it is, will, almost of necessity, contain several illustrations which are below the average merit, both as to selection and execution, and this work is not an exception in this respect. In considering, however, that Dr. Morrow has presented or brought together from one to two hundred pictorial illustrations of cutaneous diseases, it may be truthfully stated that, taken in its entirety, the selections and representations have been well made, reflecting great credit upon the distinguished author. To those, therefore, whose clinical opportunities are somewhat limited, this atlas, with its accompanying brief and clearly-written text, may be safely and cordially commended.

SEVENTEENTH ANNUAL REPORT OF THE MATERNITY HOSPITAL, 734 South Tenth Street, Philadelphia, 1890.
Press of Patterson & White.

We no longer believe in punishing the unborn or new-born infant for its mother's follies and frailties. We are gradually getting to the point where we no longer consider it immoral to provide a lying-in place for unmarried mothers; no longer feel that we are accessories after the fact if we render them some assistance, afford them temporary shelter. This moral point being disposed of, it is to be hoped that many readers will read, and reading, take to heart and favor and encourage the efforts of the Maternity. When we consider the work it has done and the excellent way it has done it, the low mortality in a class of births of proverbial high mortality, we only feel regret that its means are not larger and that its field of work is curtailed by pecuniary necessity. Since the opening of the hospital fifteen hundred and five confinements have taken place there, with a percentage of deaths from septic causes of .73; from all causes, 1.32; but during the last few years of antiseptics the percentage is, with a greatly increased number of inmates, .34, which is a gratifying and excellent result under the circumstances. E. W. W.

HAND-BOOK TO DR. KOCH'S TREATMENT IN TUBERCULAR DISEASE. By Edward F. Grün, M.R.C.S., L.R.C.P., and Walter D. Severn, A.R.C.S.
Published by G. A. Churchill, New Burlington Street, London.

At a time when the whole world is excited and expectant in regard to the recent discovery of Dr. Koch, anything bearing upon the topic is eagerly sought. The Hand-Book, the authors tell us, was issued in four days after their return from Berlin, and was designed to provide the earliest authentic intelligence to anxious readers. The authors seem to have enjoyed excellent opportunities of study in Berlin, and to have made good use of them. They give, first, a rapid account of the bacilli, then a very short, plain, and useful description of the methods in use of staining these in examining for bacilli, also the method of making cultures, and Professor Koch's four postulates, which must be fairly met before the proof is complete "that any green parasite is the cause of a disease."

The lymph is described, but its origin is to the authors actually unknown. They feel sure that it is not an attenuation, but would suggest that "this treatment depends for its principle on the fact that the bacillus, like others, is killed by an excess of its own poisonous excreta, which bacterial excreta are called 'ptomaïnes.'".

The amount of the dose as actually administered is described, and the reason of its minuteness. The syringe in use is also given, though we could wish that, in the absence of plates, this discription had been somewhat clearer in some points. The chosen location for the injections, their frequency, in fact the whole technique, is thoroughly and practically given us, so that any man of medical education and moderate ability can safely perform them, if he can obtain the lymph.

The remainder of the book is composed of records of cases with remarks. This is, so far as we have seen, the best guide to a thorough understanding of Koch's method, and until something better arrives should be read by all. E. W. W.

Correspondence.

PARIS.

(From our Special Correspondent.)

Koch's Remedy in France—Uralium as a Hypnotic—Cocoa-Nut Oil for Tapeworm—Carbon Bisulphide in Phthisis—Therapeutic Uses of Retinol—Academy of Medicine Prizes.

The first death in France from Koch's lymph took place December 12 in the Saint-Louis Hospital, Paris. It is true the patient was in a most precarious condition when inoculated, and perhaps the dose ill-adjusted to the case, yet there is no doubt that Koch's cure killed him. Other like accidents will surely occur here as they have elsewhere, and then the inevitable reaction will set in. It has been the fortune of nearly all important discoveries to be first lauded to the skies, and afterwards unjustly depreciated, before their true value secured general recognition, and the probabilities are that Koch's lymph will prove no exception to the rule. If so, we may hope some relief from our present surfeit of the tuberculosis cure. The worst is that daily papers, always in quest of sensations, have been publishing ill-digested articles, reports, and interviews on Koch's discovery. For over a week it has been Koch for breakfast, Koch for lunch, and Koch for dinner; in fact, "*toujours du Koch*," till we are heartily sick of it. On the other hand, the medical and scientific side of the question remains in *statu quo*. All agree that, at all events, the discovery is a most important one scientifically, but that a year at least must pass before its curative and therapeutic value can be ascertained. On the whole, the medical profession are favorably disposed towards the new method, and mean to give it a fair trial. But there is one point—that is, the secret character of the remedy—which all agree to condemn, and with all the more reason that there are illustrious precedents to go by. For instance, when Jenner discovered cow-pox vaccination, he did not make a patent medicine of it, but generously published his process for the benefit of mankind. And now, recently, when Pasteur found the charbon vaccination, he not only published his method, but would supply the liquid to all for a nominal sum, barely covering the price of the glass. He acted likewise with the chicken-cholera cure; and, as regards his hydrophobia treatment, he not only published at once his process, but has kept on inoculating all gratuitously, and instructing all physicians in the mode of preparing and using the virus. Koch's secrecy, and five or six dollars a five-gramme vial, hardly look well in comparison. And yet people here do not find fault with him personally. They seem to think he is compelled to obey superior orders, and the public blame and slightly ridicule the Prussian government for going into the patent medicine business.

By the way, in the last number of the THERAPEUTIC GAZETTE allusion was made in this correspondence to the congratulatory telegram sent by Pasteur to Dr. Koch. As you probably know by this time, Dr. Koch wrote in reply a very complimentary letter of thanks, accompanied with two vials of his lymph, which he presented to his French brother scientist for experimenting. The specimens were thankfully acknowledged, but tuberculosis not being one of the affections treated at the Pasteur Institute, the lymph was turned over to the *Assistance Publique*,—that is, the Paris Hospital Board,—to be handed to such physicians as have tuberculous patients in their service.

Uralium, also called ural and chloral-urethan, one of the many hypnotics recently introduced, has, so far, never been used much in France. Owing to rather favorable reports from foreign sources, Drs. Schmitt and P. Parisot have undertaken a thorough investigation on the real therapeutic value of uralium. To begin with, the insolubility of the chemical is a disadvantage. Its only practical solvent, fifty per cent. alcohol dissolves it so sparingly that 30 to 50 grammes (8 to 13 drachms) of it will not take up much more than 2½ grammes (38 grains). This dose of uralium was in consequence the maximum one administered to avoid the direct effect of alcohol. Among the patients suffering from habitual insomnia, different morbid types were selected, such as epileptic and senile dementia; hypochondria, syphilitic hemiplegia, aortic deficiency, chronic bronchitis, phthisis, and psoriasis. The following were the results observed: No real soporific effect was obtained with doses less than 1 gramme (15 grains), but even with that or higher doses an hypnotic effect is not always certain. Sleep, when obtained, will not begin sooner than one hour, and occasionally three or four hours, after administration. There will be, first, an average period of two hours' sleep, followed sometimes by a second and a third resting period, sometimes

by complete insomnia. The sleep is not deep, as the slightest noise, cough, or pain will trouble it. It is quiet enough, as a rule, except perhaps with restless insane. On awaking, the patient will recover at once full clearness of mind. It only happened twice that a tendency to sleep was observed during the day ; slight vertigo was also occasionally noticed. On the other hand, uralium was found to have no action, favorable or otherwise, on circulation or on the urinary secretion. With the digestive functions, however, the case is different. The medicine has so unpleasant a taste that it is with difficulty taken by most patients. Sometimes it will occasion vomiting soon after it has been administered, and in dyspeptic patients a nauseous state, lasting for several days ; it may also cause loss of appetite, gastralgia, and intestinal disturbances. Now, to compare uralium with other hypnotics, its inferiority will become apparent. It was noticed, for instance, that when chloral failed with some patients, uralium failed equally with the same. But, after 2½-gramme doses of uralium had failed, the same dose of chloral was often sure to bring rest and sleep. Opium and its preparations proved also better as hypnotics and soporifics than uralium, and, besides, are much easier to administer. To recapitulate : Drs. Schmitt and P. Parisot give it as their conclusions that uralium possesses real but inconstant hypnotic properties ; the sleep induced is quiet, but light and interrupted ; the medicine is not well borne by patients ; it readily occasions digestive troubles ; and, finally, as a soporific, it is inferior to both chloral and opium.

Now, to turn from the complicated coal-tar derivatives to nature's simple remedies, Dr. Parisi, of Athens, Greece, has communicated to the French medical papers his experience with cocoa-nut oil as a tapeworm remedy. As he was travelling in Abyssinia, one day, after eating and drinking the pulp and milk of several cocoa-nuts, he felt quite sick. Soon he had a passage, and was astonished to notice he had expelled a complete tapeworm, head and all, quite dead. On his return to Athens he repeated the experiment on a number of patients, and was successful in all cases ; the tænia always coming out entire and dead. The treatment he has adopted as most convenient is as follows : The patient, while fasting, is to take in the morning the milk and pulp of one cocoa-nut. No cathartic is needed, and no particular care necessary. This simple remedy is as efficient as pomegranate-root or male fern, and, for several reasons, preferable to them.

It is also to a Greek physician that we are indebted for a new remedy against phthisis, and, like the preceding, communicated to the French papers. It may not be amiss to explain that many Greek young men are in the habit of coming to France to finish their medical education, and, as they easily acquire the language, they afterwards send their most important papers to French publications to profit by their wider circulation. Well, Dr. Coromilas, of Kalamata, Greece, in 1889, while in France, published his first observations on the effects of carbon bisulphide inhalations in phthisis. Since his return to his own country he has continued the experiments, which, by the way, are based on the fact that carbon bisulphide vapors he noticed to be deadly to Koch's bacillus. In sixteen months, sixty-one cases were treated by the inhalations, combined with calcium phosphate, administered in the usual way. The results have been thirty-nine radically cured, four cured after a second treatment ; twelve felt so much improved that they went home, thinking themselves cured ; and, lastly, ten, the worst cases, died. The treatment was employed with equal success by other Greek physicians, and notably by Dr. Economopoulo, who thus saved his own brother, aged over 50, who hitherto failed to derive any benefit from all other medicines.

The therapeutic value of retinol has been the subject of an interesting communication made by Mr. Ferdinand Vigier to the Society of Practical Medicine. Retinol, or purified oil of resin, is obtained by the dry distillation of resin. It is a yellowish, oily liquid, of specific gravity .900, with a faint resinous odor and slightly acid reaction, which is used in the arts ; but, owing to its antiseptic and solvent properties, deserves to be employed in therapeutics. Its advantages in pharmacy will readily be perceived from the fact that it dissolves ten per cent. of salol, two of naphthol, five of camphor, three of cocaine, and two and a half per cent. of chrysophanic acid, codeine, and strychnine. Besides, it is miscible with oil of cade, carbolic acid, oil of turpentine, alcohol, and ether, as well as with vaseline and most fatty substances and oils. If we add that it does not irritate the skin, is unaltered by light, not liable to become rancid, and, lastly, that it is inexpensive, an idea will be formed of the variety and scope of the uses of retinol in therapeutics. As an excipient, it will be found most

convenient for exhibiting more potent antiseptics. But without any addition, it has proved to be efficient in various affections, such as blennorrhagia and vaginitis. There it acts painlessly as an antiseptic and lubricant. In skin-diseases it has also been used with success, both when employed alone and when taken as a mild antiseptic vehicle for other preparations.

On December 16 the French Academy of Medicine held its annual meeting for the customary distribution of prizes, and the reading of the new subjects proposed for the future awards within the gift of the Academy. On this occasion ladies are admitted to the floor, and invade, without mercy, the best seats and desks. It is a sight to see bright faces and fashionable bonnets in places usually occupied by sober-looking men with bald pates, while the older gentlemen wander aimlessly, slightly annoyed at being disturbed, but well pleased with the more entertaining company. This year the learned Academy distributed some nine thousand dollars among fifty prizemen; also nine gold medals, four vermeil, one hundred and thirty-nine silver, and thirty-two bronze medals. Twelve candidates, besides, were honorably mentioned for their efforts. And yet quite a number of prizes were not awarded this year because there was either no one competing for the awards or none deserving them. Among the unclaimed prizes, one deserves mention,—namely, the Saint-Paul, of five thousand dollars, offered for the discovery of diphtheria cure; only the accrued interest—five hundred dollars—was granted as an encouragement for valuable investigations.

PARIS, FRANCE, December 19, 1890.

ARE DIGITALIS AND OPIUM ANTAGONISTIC?

To the Editor of the THERAPEUTIC GAZETTE:

DEAR SIR:—This query was presented to my mind by the following case:

Mr. P., a young white man, was found, about 5 P.M., unconscious in the cellar of his place of business. A bottle was found near him, which contained a few drops of a dark fluid, which smelled and tasted like tincture of digitalis. I was told that his family physician had prescribed tincture of digitalis for attacks of angina pectoris, from which he suffered.

His face was flushed and covered with perspiration; pupils dilated; pulse 112, but soon fell to 96; temperature 100.8° in axilla; respiration was noted, as it appeared normal. His stomach was emptied and washed out with a stomach-pump. A hypodermic injection of $\frac{1}{4}$ grain of morphine and $\frac{1}{150}$ grain of atropine was then administered. An hour and a half later he regained consciousness sufficiently to answer questions, though in rather a dazed manner. I saw him again three hours later. He was then perfectly conscious, and told me that he had become despondent on account of the attacks of angina pectoris, and had tried to commit suicide by taking half an ounce of laudanum and one ounce of tincture of digitalis shortly after 3 P.M.

Although I do not claim from this single case that digitalis is antagonistic to opium, yet the history of the case would indicate that it was so; for although he had taken half an ounce of laudanum, and I had given him quarter of a grain of morphine hypodermically, he showed no symptoms of opium narcosis, and aroused from his stupor while the room was perfectly quiet, four hours after taking the laudanum, and one and a half hours after I gave the injection, and remained awake for five or six hours. He then became drowsy, and slept a good deal during the next two days. He complained of dizziness and a dull pain in the region of his heart for several days.

I find only one case of opium-poisoning reported in which digitalis was used. In that case two and a half drachms of tincture of digitalis, in divided doses, was given hypodermically to stimulate a weak action of the heart. The patient recovered. I also found a case of digitalis-poisoning, reported by Dr. Thos. Beddoes, in the *Medical News and Observations*, London, 1793, in which opium was used with good results. The patient had taken a large quantity of infusion of digitalis, which produced very alarming symptoms. He gave one and a half grains of opium, and repeated the dose in an hour, and afterwards gave fifteen drops of tincture of opium until the patient fell asleep. For two days the patient was critically ill, and had to be kept under the influence of opium.

It seems to me worthy of further investigation to discover the exact relationship between these two drugs, and whether they possess antagonistic properties.

Although it may not be antagonistic to opium, yet I think it can be used with great benefit in opium-poisoning in conjunction

with atropine, as it would counteract the cardiac depression produced by atropine when given in large doses.

R. M. ELLYSON, M.D.

1535 EIGHTH STREET, N. W.,
WASHINGTON, D. C.

RARE COMPLICATION OF MEASLES.

To the Editor of the THERAPEUTIC GAZETTE:

DEAR SIR:—The case reported by Dr. W. P. Ellis in vol. xiv. p. 567 of the GAZETTE, and commented upon by Dr. H. F. Slifer, p. 786, reminds me of a case of subcutaneous emphysema in a 3½-year-old boy, whom I saw two years ago. He was like an air-cushion over the neck, body, and upper extremities. I presume it would have extended to the lower extremities but for treatment. The most remarkable thing about the case was, that it came on in the absence of any violent cough or any known injury, such as a fall or sudden blow upon the thorax. He had only a slight bronchial catarrh, which would have passed entirely unnoticed but for the advent of this phenomenal emphysema. I gave him a sedative cough mixture, and bandaged him comfortably,—extremities, body, and neck. He recovered in a few days.

Very truly yours,

SAMUEL W. KELLEY, M.D.

CLEVELAND, O., December 12, 1890.

Notes and Queries.

A VENEZUELAN PHYSICIAN ON THE TREATMENT OF YELLOW FEVER.

A monograph on yellow fever, by DR. MANUEL DAGNINO, of Maracaibo, Venezuela, has been published at the expense of the municipal authorities. In this work the author describes his usual method of treating the disease. The first thing to do when any suspicion of yellow fever has arisen is to soothe the patient's alarm and put him under as suitable conditions of temperature, ventilation, etc., as possible. The stomach and intestines are usually best cleared out by an emetic and a purgative draught or enema, and a stimulant foot-bath given, followed by massage of the body, and especially of the parts about the waist, practised with oil and spirit. Sinapisms should then be applied, and acetate of ammonia in considerable doses prescribed. Leeches or venesection may be required. Pain about the waist, which is frequently most distressing, may generally be relieved by dry cupping. A quinine, calomel, and rhubarb pill is ordered every two or three hours, and cold or iced acid drinks, and no food allowed for at least three days. In order to combat the black vomit, small and frequent doses of chlorate of potassium with bicarbonate of sodium are very useful. Lime-water, with a minute quantity of opium, is also a valuable remedy, but creosote, which is sometimes recommended, has not seemed to Dr. Dagnino to diminish, but rather to increase, the black vomit. After graduating in 1860, at the University of Caracas, he had no definite ideas on the subject of treatment, and therefore tried for some time various plans as recommended by well-known authorities with most disappointing results. Subsequently becoming satisfied that the liver was the organ mainly affected, he recommenced the routine practice of giving quinine to destroy the virus, and calomel and rhubarb to act on the liver, with the result that for many years he lost only from eight to ten per cent. of his case. A few years after he commenced this plan he heard that an English medical man in the West Indies had adopted somewhat similar methods, giving, however, much larger doses of quinine than Dr. Dagnino considers necessary. Since the introduction of antipyrin he has given it alone or combined with quinine in cases where the temperature has risen to 40° C., as he believes that a very high temperature alone is a fruitful source of accidents in this and all other fevers.—*Lancet*, November 1, 1890.

THE METRIC SYSTEM OF WEIGHTS AND MEASURES.

A committee appointed at the last meeting of the American Association for the Advancement of Science, to aid in the more general adoption of the metric system of weights and measures among professional men, and especially among physicians and pharmacists, has been doing good work, in conjunction with the superintendent of the United States Coast and Geodetic Survey. The above-named committee, consisting of Professor Wm. H. Seaman, M.D., Dr. Fred. Hoffmann, and Professor Robt. B. Warder, has addressed a circular "To Physicians and Professors of Therapeutics, Materia Medica, and Pharmacy," in which the advantages of the metric system are ably presented. There is no

doubt that the metric system is far superior to all other systems, and that it is only a question of time until it will be adopted by the United States government and by all scientific bodies. The committee before mentioned justifies its address to the physicians, and very properly, because of the adoption of the metric system by the convention for the revision of the United States Pharmacopœia, held in Washington in May last. To assist the physician in his effort to adopt the metric system in writing his prescriptions, the following specimen prescription and explanatory statements are given:

METRIC PRESCRIPTION.

℞	Morphinæ sulph.,	0	06
	Chloralis,	6	
	Syrupi,	25	
	Aquæ, ad	100	

Sig.—Tablespoonful every four hours until relieved.

On the back of the prescription-blank may be printed:

METRIC SYSTEM IN MEDICINE.

	Grammes.	Decimals.
1 grain or 1 minim equals	0	06
15 grains or 15 minims equal	1	
1 drachm or 1 fluidrachm equals	4	
1 ounce or 1 fluidounce equals	32	

The cubic centimetre (c.c.) may be considered equal to the gramme for water or aqueous solutions.

Liquids lighter or heavier than water should either be weighed or a proper allowance made.

An ordinary teaspoon, when full, contains five cubic centimetres, a dessertspoon fifteen, and a tablespoon twenty.

Another circular, emanating from the same committee, contains the following table.

For the use of these professions, six lines contain all that is necessary, as follows:

1000 milligrammes make 1 gramme.

1000 grammes or cubic centimetres make 1 kilo or litre.

1000 kilos make 1 ton.

65 milligrammes make 1 grain.

15½ grains make 1 gramme.

31 grammes make one ounce Troy.

In writing prescriptions, a vertical line should be drawn between grammes and milligrammes, all figures on the left read grammes, all on the right to three figures, respectively, deci-, centi-, and milligrammes.

As has already been said, the committee is doing important work, but if physicians are to be guided by the recommendations of the Pharmacopœia in the matter of weights and measures, it would appear that in the matter of nomenclature the same obedience should be accorded it. The Pharmacopœia of 1880 recommends that names of all alkaloids should end in "ina" in place of "ia." Reference to the specimen prescription will show that the committee is ten years behind the times where nomenclature is concerned, while posing as scouts for the army that is to invade the metric territory.—*Pittsburg Medical Review*, November, 1890.

DIGESTION OF FAT.

Two essays that have recently appeared deal with the important subject of the digestion and absorption of fat. MINKOWSKI and ABELMANN have both investigated the effects of entire removal of the pancreas and of the ablation of the greater part of the gland. They find that in dogs totally deprived of the pancreas when meat and bread with milk were given in such quantities as to supply 7 to 24 grammes of nitrogen daily (which represented from 45 to 153 grammes of albumen), forty-four per cent. on the average underwent absorption, the extremes being twenty-two to fifty-eight. In dogs in which a small portion of the gland remained, on an average fifty-four per cent. was absorbed, the extremes being forty to eighty-three, the lowest amount absorbed being always associated with the most imperfect absorption of fat. The albumen of meat was, as in healthy animals, better absorbed than that of milk. The addition of fresh pancreas to the diet caused an immediate rise in the amount of nitrogen absorbed to seventy-four to seventy-eight per cent. of that ingested. Of starchy compounds, which were given to the amount of 151 to 176 grammes *per diem* with the milk and the bread, fifty-seven to seventy-one per cent. was absorbed in animals entirely destitute of a pancreas, while after partial extirpation from seventy-seven to seventy-eight per cent. was absorbed. In regard to oleaginous compounds, it was found that when butter, olive oil, or lipanin, which is a preparation of olive oil, was administered to dogs without a pancreas in proportions varying from 36 to 78 grammes *per diem*, the whole of the fat reappeared in the fæces; but when fresh pancreas was administered, absorption to the extent of from forty-eight to seventy-three per cent. took place, which is a noteworthy fact. In animals in which partial removal of the pancreas had only been effected, from twenty-five to

fifty-nine per cent. of fats was absorbed, though in these cases of course no fresh pancreas was supplied as food. On milk diet from twenty-eight to fifty-three per cent. of the fats was absorbed in dogs without a pancreas, and in those with some remains of pancreas sixty-five to eighty per cent., whence it appears that all fats, except those of the pancreas, require the presence of pancreatic juice to enable them to be absorbed. It is remarkable that, notwithstanding that the fats were wholly discharged from the economy in cases where the pancreas had been entirely removed, they were in great part—in fact, nearly to the extent of four-fifths—in the state of fatty acids, though partly also in the form of soaps. Minkowski thinks these facts point to an action of the pancreatic juice on the absorbing epithelium of the intestinal canal. It is difficult, however, to accept this theory in view of the absorption of milk in the absence of a pancreas.—*Lancet*, November 22, 1890.

TREATMENT OF CHRONIC DIARRHŒA WITH FLUID EXTRACT OF HYSTRIONICA BAYLEHUEN.

Dr. H. Gilbert, of Hamellsville, N. Y., sends us the following report of these cases of chronic diarrhœa cured through the administration of fluid extract of hystrionica baylehuen:

Case I.—Mrs. H., aged 45; consulted in April last for chronic diarrhœa, saying that she had taken various remedies without any material benefit. Her diarrhœa had lasted for about three years. I at first prescribed arsenite of copper, from which she derived some benefit, but she suffered from constant relapses. Some time in June I directed Mrs. H. to take 6 drops of fluid extract of hystrionica baylehuen every six hours. There was marked improvement after one week, after which I ordered 10 drops at same intervals. Improvement was rapid as the 10-drop doses were taken. This patient continued treatment until about two and a half ounces had been taken. At this she considered herself well. I advised her to continue until another ounce had been taken. At this time, December 10, 1890, my patient continues well, and has had no relapse.

Case II.—Mrs. R., aged 47; has had chronic diarrhœa for seven years, having from eight to ten stools daily. I had gone through the routine of astringents and alteratives, when I prescribed hystrionica in 10-drop doses at meal-time. Improvement was manifest after one week's treatment. She continued the treatment nearly two months, when her stools became natural, and the patient has continued well up to the present writing.

Case III.—Wm. T., aged 28; has had chronic diarrhœa of over three years' duration. When he came to me he was using camphor and opium pills to keep bowels in check, so that he could follow his occupation as shoemaker. I prescribed fluid extract of hystrionica, as in the other cases. Improvement commenced within two weeks after commencing the remedy. I do not know how much this patient took, but think about four ounces. When last seen, in October last, he was perfectly well, and had gained twenty-eight pounds in weight.

I should add here that both Cases I. and II. gained in weight, and, as they expressed themselves, enjoyed the best of health, and this, too, when pursuing their ordinary occupation.

Case I. was a professional nurse and Case II. was a washerwoman. Several other cases of less severity than the above have been cured. I consider the remedy of the utmost value in this disease.

NITROGLYCERIN IN EPILEPSY.

In the *Physician and Surgeon* for December, 1890, Dr. R. R. Lansing states that in the early part of this year he was called to attend a multipara, aged 27, and found her in a severe attack of hystero-epilepsy, which could only be controlled by the use of an anæsthetic, various antispasmodics having been tried without effect. About a month later a second attack came on, in which a hypodermic injection of $\frac{1}{100}$ of a grain of nitroglycerin was administered, and produced entire relief in a few minutes. The next day, it is stated, a slight attack occurred, and was likewise relieved in a similar manner.

There seems in this case, however, to be no proof that the case was one of pure epilepsy, but evidently was of hysterical character. This criticism also applies to the other case detailed, so that, although perhaps Dr. Lansing is entitled to whatever credit there may be in the employment of this remedy in such cases, we hardly think that he has proved that true epilepsy can be relieved by its use. It is not, however, improbable that such might be the case, and it might be worth while to test it in undoubted epileptic attacks.

LIFE-SAVING METHODS IN STILL-BIRTHS.

At the meeting of the New York Academy of Medicine, held December 4, 1890, Dr. W. T. Lusk read a paper with the above title (*Medical Record*, December 13, 1890).

The chief object in presenting the paper was to impress the need of persistent and intelligent application of known methods of procedure. These methods related to the clearing of the respiratory passages of mucus, etc., introducing air into the lungs by catheter, Sylvester's or Schultze's methods, aiding circulation by Schultze's method especially, and stimulating the respiratory centre by the means just mentioned, and also by the application alternately of warm and cold water. It was the manner of applying these well-known means which was all important. By their intelligent use, almost hopeless cases might finally be saved, while by their misuse life had sometimes been needlessly sacrificed.

The following was an illustrative case of successful efforts to save a still-birth: A few weeks ago he was called to the bedside of a primipara in labor. The child's head was in the pelvis, but for the past two hours had made no progress. Extraction of the head by the forceps was easily accomplished. The cord was tight around the neck. This he divided by the scissors, but when the child was extracted respiration had ceased; it was in a state of asphyxia. It was placed upon a table wrapped in warm cloths. The mucus was expelled from the posterior fauces. A No. 8 English catheter was passed into the trachea, and mucus was removed by suction. The quantity of the mucus in the bronchial tubes was large, and the catheter had to be introduced many times. Direct inflation was then practised. In ten minutes heart movements were observed, but they ceased again, and the steps already mentioned had to be repeated. But by perseverance in the treatment they at last observed a little color on the surface of the child. It was then immersed in warm water, lifted out, and cool water sprinkled on the epigastrium. Schultze's method was then practised, followed by Sylvester's. In employing the latter it was necessary to pull the tongue forward, and depress the base. It was not until nearly three hours of constant use of warm baths and cold sprinkling of the surface, alternate resort to Schultze's and Sylvester's methods that respiratory movements were finally established. The next day the child had cramps, but with constant medical attention these ceased after twenty-four hours. It was now in robust health and the joy of a family.

The means for exciting spontaneous respiratory movements should not be selected by divining-rod methods, but by knowledge of physiological law. It was known that during the period of gestation the child remained in a state of apnœa, the respiratory function being performed by the placenta. As soon as the child was born in normal cases the thorax expanded, the diaphragm contracted, and pulmonary respiration was established. The premature establishment of pulmonary respiration while the child was still in the passages was followed by asphyxia and was the usual cause of still-births. Experiments on animals had shown that if, during uterine gestation, placental circulation were suspended, the accumulation of certain materials in the blood was capable of exciting the respiratory centre in the medulla oblongata without the aid of peripheral stimuli, while the latter were capable of exciting the respiratory act before the internal stimuli had increased sufficiently to induce independent action.

At this point the author described the fœtal circulation by diagram.

The conditions which prevailed in asphyxia were somewhat different. When the child breathed *in utero* (and in nearly all cases of asphyxia after birth it had breathed *in utero*), we might say that the intrauterine respiration was due either to tetanic contractions of the uterus (which was not uncommon at a time when ergot was given frequently before detachment of the placenta), to premature death of the mother, and, most common of all, to pressure upon the cord. Pressure upon the cord, cutting off the placental circulation, caused the child, as he had already stated, to breathe *in utero*. The amniotic fluid, meconium, epithelium, and mucus were drawn into the respiratory passages, first into the nose and throat, and, where the inspirations had been active, on down into the trachea and bronchi. There was at the same time increased tension upon the blood-vessels and right side of the heart. As no air reached the lungs, the medulla lost its irritability and the respirations were suspended. At the time respirations were suspended the vessels and the heart were found enormously distended with blood. The lungs were also filled with blood, and when respiration had been well marked, there was pulmonary congestion, pleural ecchymoses, etc.

If the pressure on the cord were only tem-

porary, the fœtal circulation would again resume its way and apnœa return.

In still-births the prognosis depended upon the degree of asphyxia. In milder cases the muscular tone was preserved, the head did not drop, the skin was dusky red or cyanotic, the conjunctivæ were congested, the umbilical vessels distended, reflex movements could be excited by irritation, etc. In these cases respiration often returned. In more advanced cases the head drooped, there was loss of muscular tone, the heart-beats were feeble and infrequent, the umbilical vessels nearly empty, the cutaneous circulation had disappeared, the surface was pale and cold; if respirations occurred they were very feeble, and were not associated with movements of the muscles of the face. The first sign of recovery was refilling of the cutaneous capillaries and regaining of muscular tonicity.

The indications in all cases were to clear out the air-passages, restore the irritability of the medulla, increase the force of the heart-contractions, relieve the plethora of the heart and blood-channels, and expand the thorax. Where muscular tonicity was yet present these conditions were easily fulfilled. But long-continued and careful resort to methods already suggested was called for in the second class of cases.

The author here demonstrated Schultze's method upon the infant cadaver. With the infant's back towards him, the operator placed his thumbs upon the head, the index-fingers in the arm-pits, the hands diagonally across the back, the child's body hanging. Thus pulling up on the thoracic muscles, the upper ribs were drawn upward, while the attachments of the abdominal muscles drew the lower ribs downward, the diaphragm descended, and in this way the cavity of the chest was expanded to the greatest degree, and inspiration was favored. Then, by extending the hands horizontally, and giving a light turn forward and upward, bending the child forward, the abdominal viscera pushed up the diaphragm, the ribs were brought in close contact with one another, and the most efficient form of expiration was produced. There was, perhaps, no other way in which the mucosities in the lungs could be so efficiently expelled. In order to completely ventilate the lungs, the child was swung over between the hands a few turns before being laid away. But the greatest advantage was derived from the manner in which the congested heart-cavities and vessels of the thorax were unloaded by these movements. Where there was deep asphyxia, all movements to restore the child should involve a minimum degree of disturbance; otherwise the heart would cease to act, and all signs of life become extinct. He had known this to occur in several cases. But there was no danger involved in aspirating the lungs through a hard rubber catheter.

TUBERCULOSIS OF THE PERITONEUM.

In the *Deutsches Archiv für Klinische Medicin*, xlvi., Hefte 3 und 4, VIERORDT, whose researches on tuberculosis of the serous membranes are well known, sums up the results of his investigations thus: 1. Subacute and chronic inflammation of the peritoneum is very commonly tubercular. 2. In any single case of chronic peritonitis, of which the etiology is uncertain, one must bear in mind the possibility of tuberculosis. 3. Peritonitis of a non-tubercular character can exhibit symptoms (hectic, wasting condition of abdomen, concomitant affections of other serous membranes) precisely similar to those exhibited by tubercular disease. 4. Therefore, one cannot at once designate a case of chronic peritonitis as tubercular, even if it does exhibit these peculiarities, or even if the characteristic intervals of apparent convalescence, so often seen in the tubercular form, are observed. 5. That tubercular peritonitis can be cured by rest in bed, suitable diet, and other treatment is certain; but if, after a full trial of such treatment, no improvement occurs before the strength of the patient has seriously suffered, laparotomy should be performed. Simple puncture is of no avail. 6. In considering the advantages of laparotomy, distinction must be drawn between incision, with removal of the exudation, and more extensive operations. 7. A simple incision is often successful in suitable cases; such are cases of peritonitis in which the inflammation has spread from some other serous membrane (more especially the pleura), and in which the disease in the first membrane attacked is progressing favorably. 8. Even if there is an active tubercular process progressing in the pleura or pericardium an incision is often beneficial. 9. In all cases it should be a rule, when an incision into the abdomen is made, that a small piece of tissue should be removed for microscopical examination or, if possible, for inoculation experiments.—*Lancet*, November 8, 1890.

CREOLIN: ANTISEPTIC OR TOXIC?

Some important evidence as to the action of creolin on the human subject may be gathered from a thesis on that compound published at Breslau during the course of this year. Dr. Bitter, the author, notes that creolin has already been used in more than two thousand midwifery cases at Breslau. As appears to be the case with nearly every new compound of the kind, the results, according to Drs. Born and Bitter, are most encouraging. In four of the midwifery cases, however, symptoms of poisoning occurred during the administration of a course of creolin injections. Three of the patients were suddenly seized with feelings of restlessness, anxiety, nausea, darkness before the eyes, and a tendency to syncope. The most peculiar feature in these cases was a strong flavor of tea or smoke in the mouth, of which all the patients complained. This symptom lasted for a long time, while the nausea, etc., disappeared immediately upon the discontinuance of the vaginal injections of creolin. The fourth case was more severe; the patient suffered from great restlessness and prostration for several days after the injections were left off. About thirty-six hours after the beginning of the attack the urine, drawn off with the catheter, was very dark and strongly albuminous. Within a few days these symptoms of acute nephritis disappeared. Dr. Bitter advocates creolin as superior to other disinfectants on account of its "relatively" (*sic*) non-poisonous qualities, its excellence as a deodorizer, and its blandness when applied to skin, mucous membranes, and wounds. It neither dries the vaginal mucosa nor causes any contraction of the canal. Creolin has no special hæmostatic action. Dr. Bitter finds that there are disadvantages in creolin, as the emulsions employed for injections are opaque, and the preparation of creolin usually on sale appears to be unstable.—*British Medical Journal*, December 13, 1890.

POISONING BY SULPHONAL.

So much has been said about the safety of sulphonal, and its having no effect upon the heart, that the case reported by Dr. F. H. Dillingham in the *Medical Record* for December 13, 1890, in which alarming symptoms followed the administration of 90 grains by mistake to an elderly lady, is worthy of note.

Dr. Dillingham ordered some powders, each of which contained 30 grains, for insomnia, with directions to take one in the evening. He was called in great haste at three o'clock in the morning, and found the patient in a semi-comatose condition, rapidly passing into a state of stupor, with stertorous breathing. Her radial pulse was almost imperceptible, and extremities cold. It was found that she had taken three powders—ninety grains in all—at 9 P.M. Her breathing and stupor soon improved, and her pulse became a little slower and stronger; inco-ordination of all the muscles was extremely well marked. Her face was drawn slightly to the right side, and there was ptosis of the right eyelid; pupils were normal. At six o'clock in the morning her articulation was very poor, and it was with the greatest difficulty that what she said could be understood. Respirations were 24, pulse 130, and temperature 98° F. Her mouth was parched and tongue dry, and when she put it out it deviated to the right. She had a constant desire to urinate, but passed only about a teaspoonful at a time; the urine was normal. By noon there was a slight improvement in her condition. She had not slept, and her replies were incoherent. The next morning she was much weaker, in spite of the stimulants and milk she had taken, and her mind was not clear. The muscular complications had, however, diminished. There was paralysis of the sphincter ani, so that enemata could not be retained. In the afternoon her mind became clearer, but the inco-ordination was still marked. After this her condition gradually improved, but it was ten days before the ptosis, muscular inco-ordination, paralysis of the face, etc., entirely disappeared. The paralysis of the bladder and bowels continued for two weeks, and then began to gradually resume their normal functions. This case differs from others reported in the distressing effects on the heart, and also in the severity and persistence of the symptoms.

CETRARIN.

Kobert has recently contested the statement that cetrarin, the active principle of Iceland moss, produces an increase in the blood-pressure, while further, his experiments on a large number of animals have shown that this remedy increases the peristaltic movements of the intestines, and is therefore of value in the treatment of chronic constipation. It further is stated to increase the number of the red and the white blood-corpuscles, especially when they have been reduced below normal in various chronic diseases, while,

finally, it is a mild stimulant to the central nervous system. It would appear from these facts that the employment of cetrarin is indicated in chlorotic individuals in whom there is loss of appetite and constipation; the dose being 1½ grains.—*Wiener Medizinische Blätter*, December 11, 1890.

THE MATTISON PRIZE—OPIUM ADDICTION AS RELATED TO RENAL DISEASE—A PRIZE OF FOUR HUNDRED DOLLARS.

With the object of advancing scientific study and settling a now moot question, Dr. J. B. Mattison, of Brooklyn, offers a prize of four hundred dollars for the best paper on "Opium Addiction as related to Renal Disease," based upon these queries:

Will the habitual use of opium, in any form, produce organic renal disease?

If so, what lesion is most likely?

What is the rationale?

The contest is to be open for two years from December 1, 1890, to either sex, and any school or language.

The prize paper is to belong to the American Association for the Cure of Inebriety, and be published in a New York medical journal, *Brooklyn Medical Journal*, and *Journal of Inebriety*.

Other papers presented are to be published in some leading medical journal, as their authors may select.

All papers are to be in possession of the chairman of the Award Committee on or before January 1, 1893.

The Committee of Award will consist of Dr. Alfred L. Loomis, President New York Academy of Medicine, chairman; Drs. H. C. Formad, Philadelphia; Ezra H. Wilson, Brooklyn; Geo. F. Shrady, and Jos. H. Raymond, editor *Brooklyn Medical Journal*.

THE PHYSIOLOGICAL ACTION OF OIL OF PENNYROYAL.

Dr. E. Falk has recently undertaken a number of experiments on rabbits to determine the physiological action of oil of pennyroyal (mentha puleguium) *Les Nouveaux Remèdes*, December 8, 1890).

He found that after either administration by the mouth or subcutaneous injections of from 7½ to 40 drops marked inco-ordination was developed, followed by paralysis of central origin and finally by death. The urine was diminished in quantity, and contained tube-casts and albumen together with leucine and tyrosine.

Post-mortem examination revealed fatty degeneration of the liver and heart, and to a less degree of the kidneys. In most cases blood-pressure was slightly increased, and the pulse slowed; the slowing of pulse being attributable in great part to central stimulation of the pneumogastrics and slightly to peripheral stimulation of these nerves. Fatty degeneration of the abdominal organs and of the heart followed after prolonged administration of the oil in doses of $\frac{1}{16}$ drop daily.

THE LIMITATIONS OF THE CURATIVE LYMPH.

It is now over three months since Professor Koch began the experiments with his lymph upon man. This is almost a sufficient time to determine whether consumption in its earliest stages can be cured. Professor Leyden has treated one hundred and twenty-seven cases, Dr. Guttmann seventy-five cases, and Professor Gerhardt seventy-nine cases. All these are, in addition to the cases first treated, directly under Koch's supervision. Among these two hundred and eighty-one cases, we hear of four deaths, while Dr. Guttmann announces four cures. Most of the remaining cases are simply "doing well."

If any experienced physician were to treat two hundred and eighty-one cases of phthisis in the very initial stage by methods already known there is very little doubt that much better results could be obtained, even within two or three months, than a simple one per cent. of cures. So far, therefore, it must be conceded that Koch's lymph has shown no special remedial power against pulmonary tuberculosis. There is a belief that it is more effective against laryngeal tuberculosis, but we hear as yet of no announced cures.

Its specific effect upon lupus is, so far, quite interesting. Temporary "cures" have certainly been produced by it.

The severest criticisms upon the action of the lymph come, naturally perhaps, from the Paris physicians. Pasteur is quoted as saying,—

"Up to this moment there has not been a single authenticated cure, not even of lupus. Dr. Bergmann himself has seen a patient suffering from lupus return to his hospital fifteen days after having been discharged as cured, a severe relapse having occurred even within that brief interval. Moreover, there is no real certainty as to the consequences of

the treatment. The medicament is of unheard of virulence, and the reactions which it brings on are terrible. No venom from a snake, if administered in such small doses (two tenths of a milligramme), could cause such results. We have therefore a toxic of such indomitable energy that it may introduce into the organism disorders the consequences of which no one can surmise, and have yet to be studied. You may have seen a report in the medical papers of yesterday that albuminuria and hæmaturia have been found in a patient who had been treated for tuberculosis to very small doses of this lymph. In fact, it is the kidneys that are particularly affected by it."

Pasteur, referring to the early publicity given to Koch's method of cure, says, in conclusion,—

"Whatever happens, you may be perfectly certain that the École Bactériologique Française will not imitate their example. So long as the results of its investigations are unascertained we shall be silent. So soon as a single point shall have been perfectly established we will report the fact in detail to the Académie de Médecine."—*Medical Record*, December 27, 1890.

TREATMENT OF SCABIES WITH CREOLIN.

According to the *Internationale Klinische Rundschau* for November 16, 1890, Dr. De Lollis employed creolin, in the form of a five per cent. vaseline ointment, in cases of scabies, rubbing it once daily into the affected parts. He claims that, as a rule, only four such applications are necessary to produce perfect cure. Creolin, in the author's opinion, is preferable to any other remedy for this purpose, especially possessing the advantage over sulphur in not producing any eczema of the skin, and not staining either the skin or the linen.

SOME NEW APPLICATIONS OF SILICATE OF SODA.

At the meeting of the Southern Surgical and Gynæcological Association held in Atlanta, November 11, 12, and 13, 1890, Dr. George A. Baxter, of Chattanooga, read a paper in which he said that the jacket of packed silicate of sodium possessed all the qualities to be found in a plaster jacket both of firmness and support, while weighing only one pound and six ounces (*New York Medical Journal*, December 27, 1890).

It was neater in appearance and finish, and could be perforated like leather for ventilation, which plaster could not. It was even lighter than leather without its costly process of construction, and had the same advantage over the woven wire jacket, with the additional advantage over both these latter and all others of this class, that it could be constructed by any surgeon at any time or in any place. The patient was suspended and a plaster jacket roughly placed around her and cut as soon as it had hardened enough to retain its shape, thereby lessening materially the time of suspension, the most trying ordeal with this or the plaster, and not without its dangers when long continued; the cut edges were bound together where it had been cut down directly in front with cords, and then a core of paper placed in the centre. This paper core was used for two reasons: (1) to lighten the cast and take as little plaster as possible, and (2) to dry it the more readily by heating the inside. This done, the plaster was poured around the core and inside the cast, which gave him a mould of the body in extension and counter-extension, exact in every respect. Around this was made the silicate jacket after the manner of the plaster roller bandage, weaving half-inch metal strips in the meshes of the bandage at a distance of four inches apart around the whole cast, an inside lining of a knit shirt having been first placed over the cast. The whole was then placed over a coal-oil stove and allowed to dry out, which it did in from half an hour to two hours or less, especially if the cast had been previously dried. This process of heating not only dried the silicate, but baked it as well, rendered it impervious to the action of water or the perspiration, and gave it sufficient strength to allow of its being perforated for ventilation. It was then cut from the mould with a straight incision down the centre, two pieces of leather, to which button-hooks or eyelets had been previously attached, were sewed up and down the front on each side, then the whole could be laced up solid or loosened and taken off at will. The necessity of taking off a jacket or leaving it on during the whole course of treatment would, of course, depend upon the character of the disease or the injury under treatment.

—THE—

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Original Communications.

*NEW THERAPEUTIC AGENCIES.**

LECTURE X.—SUGGESTION IN THERAPEUTICS.†

BY PROFESSOR DUJARDIN-BEAUMETZ,‡ PARIS, FRANCE.

GENTLEMEN:—I have long hesitated to approach the subject which I am to speak of to-day, and it is only in response to your urgent request that I now take up this burning question of hypnotic suggestion in therapeutics.

This subject, in fact, brings up such knotty scientific, physiological, and even religious problems, it touches upon the marvellous in so many points, that it is very difficult, in dealing with it, to place one's self on a solid and truly scientific basis, as far removed from scepticism as from an irrational partisan enthusiasm.

The marvellous and the mysterious have always had on man a preponderant influence, and when Quatrefages attributed to the human species religiosity as a characteristic, he meant to include that belief in the supernatural which dominates the thoughts

* A second series of "New Medications," published in 1887.

† From advance sheets, revised by the author (translated by E. P. Hurd, M.D.). Lectures delivered in Cochin Hospital, Paris, France.

‡ Member of the Academy of Medicine, Physician to the Cochin Hospital, Paris, France.

man, whatever may be his race or habitation.

A voluminous and very interesting work might be written on the history of the marvellous in the sciences, and, in particular, in medicine. Without here describing all the phases through which has passed this question of suggestion, I can assure you, nevertheless, that in the earliest ages medicine among all nations was based largely on suggestion. In India, the cradle of the Indo-European races, hypnotism was the foundation not only of religion but of the primitive therapeutics of that people. Those bloody festivals where the Hindoo devotee is broken under the wheels of the car of the god which he worships, those suppliants of Brahma who swing in the air suspended by cords which are thrust through their principal muscles, are instances of the power of hypnotic suggestion to animate, inspire, and support the victims of religious fanaticism.

In that same country, suggestion has taken on a particular characteristic, which constitutes a quite special branch of hypnotism. I refer to *spiritism*, to which Gibier has given the name of *occidental fakirism*,* to indicate its origin in the practices of the initiates of the sacerdotal caste,—the *yoguysts* and the *faquirs*. The faquir, in fact, is a charmer,—*i.e.*, a *suggester*,—and, as Jacolliot says, develops in the subjects who surround him phenomena of "magnetism and of somnambulism."

This spiritism, on which I shall not longer dwell, claims many distinguished and fervent believers, and we have seen Alfred Russel Wallace, who, simultaneously with Darwin, discovered the law of natural selection, and William Crooks, to whom we owe the discovery of thallium, devote themselves to the task of demonstrating by scientific experiments the reality of spiritualistic phenomena.

In Greece, in the primitive periods of history, the priests who served in the temples of Æsculapius, made great use of suggestion in the treatment of the sick; and since then, everywhere and in all places, suggestion has had a preponderant *rôle* in the history of medicine. Between the sorcerer, who still pursues his vocation of pretended healing in our villages, and his congener of Central Africa, there is no difference, and, when we compare their practices, we find them identical.

But let us leave to one side the prehistoric part of the question, as well as the thaumaturgists,—the expellers of demons; in a word, the miracle-workers and the adepts in the "black arts," who occupy so large a place in the history of the Middle Ages and of the Renaissance, and come down to a period when these practices take a more strictly scientific direction.

I say *direction*, for, do not forget, the suggestive practices are absolutely the same, and it is always the suggester who imposes his will, whether by touches, whether by word of mouth, whether by look; and if I were to read to you some passages from Van Helmont, from Paracelsus, from Robert Fludd, you would see that they all operate in the same way as do to-day Charcot, Luys, Bernheim, etc. You would see even Helimotius performing cures by *transferrence*, transmitting the disease from a man to an animal, or even to a tree, just as is to-day practised at the Charité the transfer of a malady from a sick to a well person. Writers, even in the ages of witchcraft, endeavored to take these phenomena out of the realm of the supernatural and of demonology and give them a scientific explanation.†

It was in the sixteenth century that the first serious attempt was made to account for these facts on scientific principles. Paracelsus pretended that there was in man a special magnetic influence, and he ascribed to magnetism (the word is his) certain phenomena akin to those with which we are now familiar, and for a long time this explanation (which really explains nothing) was accepted. From Paracelsus to Van Helmont, to Mesmer and his celebrated bucket, to Baron du Potet, and, still later, to Durville, his actual successor, this doctrine of animal magnetism has been held and taught by a great number of experts and believers.

But a physician of Manchester, James Braid, almost fifty years ago (in 1842), restated the whole question, and modified the current views on magnetism by showing that it was quite an easy matter, by fixing the attention on brilliant objects, to provoke an aggregate of phenomena, to which has been given the name of *hypnotism* or *Braidism*.‡

The facts mentioned by Braid remained long unknown,§ and, despite the communica-

* P. Gibier, "Le Spiritisme ou Fakirisme Occidental." Paris, 1887.

† Cullerre, "Magnetisme et Hypnotisme." Paris, 1886.

‡ James Braid, "Neurypnology, or the Rationale of Nervous Sleep, considered in Relation with Animal Magnetism." London, 1842.

§ Physiologists in this country and in Great Britain have been familiar with the facts and theories of

tions made from 1859 to 1865 by surgeons, who had employed this method to obtain anæsthesia, we have to come down to the communications of Lasègue in 1865, of Charles Richet in 1875, to the researches of Charcot in 1869, and, lastly, to the communications of Dumontpallier from 1881 to 1884, before we find this question of hypnotism and the phenomena which it causes seriously discussed.*

Charcot, in the communication which he made in February, 1882, to the Academy of Sciences, gave a classification of the divers nervous states determined in the hysterical by hypnotism, and under the name of *great hypnotism* he showed that in hysterical subjects it is possible to reduce to three types the various manifestations produced under the influence of hypnosis, and these three types are closely interconnected,—the cataleptic state, the lethargic state, and the somnambulic state.

While these experimental investigations were going on in the school of the Salpêtrière, the same phenomena were being studied by the Faculty of Nancy, under the influence of Professor Bernheim, one of those who have done the most to place hypnotism and suggestion on a scientific foundation. Bernheim has had an able predecessor in a physician of Nancy, Liébault, who published in 1866 a work which was almost unnoticed at the time, and had for its title, "Induced Sleep and the Analogous States."† Liébault maintained that it was quite possible by suggestion to provoke a particular state which was quite like sleep, and this might ensue under two different degrees,—light sleep and profound sleep.

There then arose between the two schools of Salpêtrière and of Nancy a dispute, which is far from being settled, and to the "*grand hypnotisme*" of the Salpêtrière is opposed the "*petit hypnotisme*" of Liébault and of Bernheim, the latter maintaining that the different phases described by Charcot and his pupils do not exist in reality, and that it suffices to excite in hypnotized patients the idea of the production of these phenomena to cause them to appear. In fact, to these physiologists these phases of the Salpêtrière school are simple phenomena of suggestion.

Lastly, our colleague Luys has quite recently applied to these phenomena another origin, which is removed from the pale of suggestion, and brought nearer to hypnotization as Braid understood it. He attributes them to *fascination*, such as may be produced by a brilliant object, as a faceted mirror, which is made to move rapidly before the eyes of the person whom it is intended to hypnotize.

Whatever may be the mode employed to induce this state, a series of phenomena is induced in certain patients, which may be summed up under three principal types, of which I will give you a rapid description.

There is, first, the *cataleptic* state. I need not describe to you catalepsy. You know that this state is characterized by immobility. The patient has a fixed stare, the eyes being turned in one direction, the countenance impassive, and you may impart to his limbs and to his body the strangest positions, and he will maintain them for a long time.

Lethargy, on the contrary, is, so to speak, the opposite of the cataleptic state. It is an absolute resolution of the limbs; there is a complete analgesia. The eyelids are closed, and the eyeballs turned upward and inward. In this stage there has been noticed a quite particular excitability of the spinal cord, to which Richet and Charcot have given the name of *neuro-muscular hyperexcitability;* in fact, under the least shock, a slight irritation, a whiff of the breath, one may cause contractures of the muscles thus influenced.

Lastly, comes the somnambulic period;

"Braidism," chiefly through the admirable exposition given by Dr. W. B. Carpenter in 1852, and later in successive editions of his "Human Physiology." The methods and results (psychological and physical) of "hypnotism" (the name originated with Braid) are very lucidly described by Carpenter, whose explanation of these phenomena, in accordance with known laws of mental and nervous physiology, has hardly been surpassed. Carpenter describes the hypnotic state under two principal phases: 1. A state of complete coma or perfect insensibility, analogous to the hysteric coma, and, like it, distinguished from the coma of cerebral oppression by a constant twinkling movement of the eyelids. 2. A state of artificial *somnambulism* or sleep-walking, which closely resembles natural somnambulism. This state is characterized by the facility with which the thoughts may be directed into any channel by the principle of "suggestion."—TRANS.

* Lasègue, "Études Médicales," t. i. p. 899, Paris, 1884. Ch. Richet, *Journal d'Anatomie et de Physiologie*, 1875; *Archives de Physiologie*, 1880; *Revue Philosophique*, 1880 and 1883; *L'Homme et l'Intelligence*, 1884. Charcot, *Progrès Médical, Gazette des Hôpitaux*, and *Gazette Médicale*, Paris, 1878. Dumontpallier, *Comptes-Rendus de la Société de Biologie*, 1881, 1882, 1883, and 1884. Bernheim, "De la Suggestion et de ses Applications à la Thérapeutique." Paris, 1886.

† Liébault, "Le Sommeil Provoqué et les États Analogues." Nancy, 1886.

this is the suggestive phase of hypnotism. Bernheim and Liébault admit six categories of hypnotization. In all, the will of operation is substituted for that of the hypnotized subject. In a first degree of this induced sleep there is somnolence, a feeling of heaviness, and the influence of suggestion is feeble, though sufficiently powerful to prevent, for instance, the patient from opening his eyes against the will of the operator. In the first and second degrees, the patient may be influenced from the point of view of automatic phenomena; then, in the other degrees, the patient is dominated entirely by suggestion, being now in relation altogether with the hypnotizer, who makes him execute movements, or suggests to him illusions and hallucinations.

I cannot enter into the detail of all the experiments of suggestion; you are familiar with them, and this state of suggestion may be produced in the waking state. Such, in their aggregate, are the phenomena which are developed, whether by suggestion, fascination, or hypnotism. The classification which I have given is absolutely theoretical, and the nervous phenomena may vary in their form and in their course in different subjects, and also in the same subject, where we often see the left side influenced differently from the right.

It remains for me to describe the manner of producing these phenomena before discussing the therapeutic value of suggestion. The modes of obtaining hypnosis, or the hypnotic state, are very varied, and you will find a description of them in the book of Bernheim.*

There are, first, the passes, once so much vaunted by the magnetizers, and which you will find described in all the special works, in particular in those of Deleuze, of Teste, of Noizet, and which are in use by the Hindoo magnetizers. Braid substituted for the passes by the magnetizers, the fixation of the eyes upon some one object, which might be a bright light, or simply the finger of the operator.

At the Salpêtrière school they employ almost anything which may excite one of the senses,—that of the hearing or sight; the sound of a gong determines the hypnotic state just as effectually as fixing the attention on a bright light; in a word, any intense sensorial impression may be employed.

Quite different is the method of producing hypnosis by suggestion; it is that employed by Liébault, Bernheim, and the school of Nancy. This method, it must be remembered, had already been applied as early as 1814 by Abbe Faria.

Abbe Faria was the first to reject the notion of a magnetic fluid, and to affirm that it was by suggestion or by volition that the operator produced sleep in hypnotized subjects; and you will permit me here to refer to the passage in which he explains his views, in his book on "Lucid Sleep."†

Faria fixed in one direction the eyes of the individual whom be desired to hypnotize, and made him look at the back of the hand raised before him; then he advanced a few steps, suddenly let fall the arm, ordering the subject to go to sleep. A similar method is employed by Liébault. "We make," he says, "the subject fix his eyes in one direction. We tell him to think of nothing but going to sleep and getting well. We announce to him the initial phenomena of sleep, the general torpor of the body, the felt desire for sleep, heaviness of the eyelids, insensibility. When we perceive that the eyelids tremble and grow heavy, that the eye takes on a vacant stare, that the pupil oscillates or dilates, we pronounce the charmed word, '*sleep!*'" Liébault adds that, if at the end of one minute, sleep does not ensue, the *séance* is postponed till another day.

The procedure of Bernheim is still easier. This is the way in which he describes his method: "The subject is supposed to be lying down or comfortably seated in an arm-chair. I allow him to remain quiet a few moments, simply saying that I am going to put him to sleep, and that his sleep will be tranquil. I gently bring my hand near his eyes, and say, 'Go to sleep.' Some shut their eyes instantly and are asleep; others, without closing the eyes, are taken with a fixed stare, and manifest all the phenomena of hypnosis. Others present certain trembling movements of the eyelids; the eyes open and shut alternately. In general, I do not allow the eyes to remain a long time open; if they do not close spontaneously, I keep them closed a short time, and if I meet with any resistance, I add, 'Stop; your lids are heavy, your limbs are benumbed, you are becoming drowsy; go to sleep.' It is rare that one or two minutes elapse without hypnosis super-

* Bernheim, "Hypnotisme, Suggestion," etc. Paris, 1891.

† Abbe Faria, "De la Cause du Sommeil Lucide." Paris, 1819.

vening. Some remain at first immovable and inert; others try to recover themselves, open their eyes, awake at each instant. I insist. I keep the eyelids shut, and I say, 'Keep on sleeping.'" *

In my own experience, when in my hospital service, I make use of hypnotism, it is by the fixation of the gaze, or by occlusion of the eyes, that I have produced sleep.

As for the awakening, this is obtained by various processes; the most ordinary consists in simply telling the patient to wake up, the voice being raised in a tone of command. Some attain the same end by blowing gently on the face of the hypnotized person.

And now that I have summed up as briefly as possible the phenomena provoked by hypnotism and the manner of producing it, let us examine the therapeutic value of this agency.

I shall not discuss here that aspect of the subject which concerns the actions of medicines at a distance on hypnotized subjects; this question seems to-day to be decided, and no one longer dares to maintain this action at a distance since the report which I presented to the Academy of Medicine in 1888 *à propos* of a communication made on this subject by Luys.†

The commission nominated by the Academy showed by a rigorous and scientific observation of the facts that there was no relation between the phenomena observed and the medicament of which usage was made. Here suggestion had everything to do with the result witnessed. It was because the operator, both in the case of the facts set forth by Bourru and those of Luys, indicated in a loud voice to the persons surrounding the patient what effects were going to follow such and such a substance, and that the patient would experience symptoms similar to those which he had heard described. And all that it was necessary to do was to keep the operator, his assistants, and the subject ignorant of the nature of the substance under experimentation to put in clear light the unreality of these effects of medicaments at a distance.

I pass now to a much more important question. What estimate should be put upon the results which may be obtained from suggestion in different pathological states?

To judge of the real value of this therapeutic agent, it is absolutely necessary to establish distinctions between the various patients who are made the subjects of hypnotic suggestion. We may in this regard establish three great classes. In the first, we will place the hysterical, whatever may be the form of this neurosis; in the second, we will put the neurasthenic, the unbalanced, the hypochondriacal; in a word, the nervous. The last category will contain all patients afflicted with organic affections with definite lesions, in whom the nervous element plays only a secondary *rôle*.

It is in the first group that suggestion or hypnosis has always produced its most positive effects. This group, as you know, is a very large one, for now that we understand better than ever before the manifestations of hysteria, thanks to the labors of Charcot and the school of Salpêtrière, we find that men even are often hysterical, and you see these cases of male hysteria quite frequently in our wards. Male hysteria is met with not only in the upper classes, but also among the common people, among the workingmen.

In this malady, whatever may be the mode which is employed to produce the hypnosis, —magnetism, suggestion, fascination,—the morbid manifestations are made to disappear, whatever may be their nature; and do not forget that these manifestations may take the form and the march of organic affections. Hysteria is the soil on which flourish most luxuriantly the pseudo-maladies. To gastric hysteria, so well described by my pupil Deniau, we may add pulmonary hysteria, which imitates phthisis, so as to deceive the unwary (see the numerous observations collected by my pupil Tostivint in his excellent thesis).‡

You easily understand how the symptoms of these pseudo-maladies may be removed in male and female hysterics by suggestion, just as the paralyses, the contractures, and other morbid manifestations of the neurosis may be made to disappear. I know of no better example to cite in this connection than that of a certain patient whom you have recently observed in our wards. This patient was a young man, about 30 years of age, who had for the third time been admitted for treatment. This hysterical subject presented gas-

* Bernheim, loc. cit., p. 89.

† Luys, "Action of Medicaments at a Distance" (*Acad. de Médecine*, 1887); Dujardin-Beaumetz, "Report on the Communication of M. Luys," February, 1888.

‡ Tostivint, "A Contribution to the Study of Pulmonary Hysteria" (*Thèse de Paris*, 1888).

tric and intestinal troubles absolutely simulating internal strangulation, and to such an extent that at Nantes the hospital staff was ready to perform lumbar colotomy; but the fear of this operation caused all his symptoms to cease. This last time he entered the hospital for attacks of hæmoptysis, which were rebellious to all treatment; but the threat of punctiform cauterizations produced speedy and complete quittance of all the pulmonary phenomena, for in these patients intimidation is a sort of suggestion.

In patients belonging to this category is suggestion always triumphant, and can we cause the element of pain to disappear at will in such subjects? Here, by the way, we enter a quite special department of our subject. I allude to the possibility of performing painful operations under the influence of anæsthesia by suggestion.

There is not the least doubt that in hysterical patients greatly susceptible to suggestion it is quite possible to banish sensibility and the notion of the external world to such a degree as to enable us to perform long and painful operations. My colleague and friend Mesnet, who has done not a little for the cause of rational hypnotism, and whose estimate is characterized by good judgment and lack of prejudice, has cited numerous convincing instances of operations performed without pain under the influence of hypnotism. It is the same with obstetrics. Mesnet, Auvard, and many others have reported cases of accouchement where the patient went through the pains of labor without conscious suffering, owing to the anæsthetic power of hypnotic suggestion.

But this action which hypnotism possesses on the sensibility has its limit, and this limit is determined by the pathological alteration of the part where the pain is produced; and while on this head, I will cite for you an example, also borrowed from our hospital service. The case is that of an hysterical woman, who has entered our wards for the fourth time. On the first occasions of her admission to the hospital she came in to be treated for contractures of the right inferior extremity. We practised "suggestions," but rather maladroitly, for instead of a unilateral contracture, she had a bilateral on awaking. Then one fine day all disappeared. She returns to-day with a sciatica, which is confined to the side on which she is totally anæsthetic. You may prick deeply the anæsthetic area, and she feels nothing; but this does not prevent her from suffering intense pain along the sciatic nerve, and here suggestion has been absolutely powerless to influence the pain.

It would be the same with a neuralgia caused by a carious tooth, or the severe pains provoked by cancer of the uterus, or even by ulcer of the stomach. On this point I part company with Bernheim, and while approving the spirit in which he has written his works, and, in particular, his "New Studies on Hypnotism," I cannot admit that the pain of the round ulcer is amenable to hypnotic treatment. That hysterical patients may experience manifestations similar to those which accompany *ulcus rotundum* I freely own, and in this case we should have to do with *pseudo-ulcers;* but when an hysterical person has a real ulcer, which destroys certain nerve-endings, we have here a lesion against which all the efforts of hypnotism will be powerless.

Let us now examine our second group, which is a large one, and comprehends a host of idle valetudinarians, of neurasthenics, of warped or nervously-broken unfortunates, of hypochondriacs, etc., who form, it must be remembered, a considerable part of the patients of the city. They consult all the doctors, all the quacks, the Christian scientists, and mediums, and the inconstancy which characterizes their ailments shows how little power suggestion has over them.

In these neuropathic patients the influence of the physician and the assurance with which he prescribes his remedies have more effect than the remedy itself. Here is the field of triumph of those granules variously colored, and over which certain medicasters make magnetic passes before administering them. Here, too, is the field of triumph of the ancient homœopaths. I say *ancient*, for to-day homœopathy, at least that kind which is professed by Jousset and his school, discards the infinitesimal doses, and no longer retains aught of the doctrine but the principle, *similia similibus;* but these men employ massive doses, just as we do.

Suggestion is also the motive principle of physicians who change the color of the paper of the sick-room, or of the shirts which the patient wears; but here such "suggestive therapeutics" are very often of but momentary efficacy, and after having derived some little benefit, the patient falls back into his old morbid ruts again, and gives himself up to some new doctor or quack without ever finding one who can completely rid him of the suffering which his morbid imagination at each instant engenders.

As for our third group, here it must be admitted that suggestion has but very little power, and is limited to the moral influence which the physician may have over the patient. This influence, it is true, belongs to the sphere of suggestion, and may be considerable. How many patients are made better by simply seeing their physician and by the assurance that they will soon get well, by the words of encouragement which he gives them. The very expression of the physician's countenance has its influence. I cannot but endorse the spirit of that old thesis once defended before the faculty, and which had for its title, "The Influence on the State of the Patient exerted by the Cheerful Demeanor of the Physician."

We have not only to consider the part played by the physician's bearing and assuring words, as hypnotic or suggestive means; the medicine itself has a certain *rôle*, and every new medicine has a period of success, which belongs to the domain of suggestion. That old asseveration—"Take this medicine; it will make you well"—expresses this notion, which has caused not a few mistakes in therapeutics.

It remains to inquire, What is the number of patients who may thus profit by hypnotic suggestion? If we refer to the figures furnished by Liébault during the year 1880, out of ten hundred and eleven persons whom he endeavored to make amenable to suggestion, he found but twenty-seven that were refractory; and, on analyzing the nine hundred and eighty-four hypnotizable persons, he showed that the characteristics of the hypnosis could be classed as follows:

Somnolence and heaviness	33
Light sleep	100
Profound sleep	460
Very profound sleep	232
Light somnambulism	31
Profound somnambulism	131

I confess that I am here again in complete disagreement with the school of Nancy, and I can affirm that nothing like this, or even approaching it, has been witnessed in our hospitals and in our practice. As I have before shown you, only hysterical patients are clearly and unmistakably benefited by suggestion, and yet there are hysterical patients who are not hypnotizable. There is, moreover, quite a group of affections with lesions in the hysterical which are not at all amenable to hypnotic treatment; and however numerous you may suppose cases of hysteria to be, they none the less constitute the exception, if we compare them with all the other diseases which we have to treat.

In conclusion, we have still to examine a last point,—Whether or not hypnotism has its evils? It has been affirmed that it is more or less dangerous to produce hypnosis in susceptible subjects, and that, instead of causing the morbid symptoms to disappear, we augment the neuropathic state of the patients, and may thus cause psychical and other troubles of great intensity. I have no opinion of my own on the subject. While we see Bernheim, Liébault, Berillon, and so many others maintain that therapeutic suggestion is perfectly safe, we see other authorities affirm its dangers, and even persuade governments, with the advice of academic societies, to prohibit the practices of hypnotism. This is what has taken place in Belgium.

I am, for my part, inclined to take my stand by the side of those writers, for this reason, if for no other, that the most earnest partisan of suggestion, Bernheim, admits that "therapeutic suggestion is an art and a science which demand a long experience and a profound acquaintance with medicine and psychology;" and in making this avowal, the professor of Nancy recognizes the fact that the practice of therapeutic hypnotism can only be made by an educated physician. This is, then, a virtual acknowledgment that it may have its dangers. And now, if I were to sum up my views, I would express myself thus:

Thanks to a more attentive study of the phenomena of suggestion, we are able to-day to establish the bases of a psycho-therapy; but this psycho therapy will never be anything but an exception in the practice of our art if we insist on limiting it to the phenomena of hypnotism properly so called; for, as I have shown you, since the foundation of medicine to our times, suggestion—*i.e.*, the influence of the physician on his patient—has played and always will play a considerable *rôle* in the result of the treatment which he orders. We have here a fact which belongs to the entire group of animal life, and which finds expression in the statement that certain beings have an influence over their fellows. But there will always remain that great group of pathological states which constitute the diseases properly so called—the pneumonias, typhoid fever, rheumatism, etc.—against which we must employ a special medication, in which hypnotism can have no part; and to suppose for a single instant that one may

simple affirmation cause the entire cortege of morbid symptoms to disappear, is a delusion and, worse than that, an error.

TREATMENT OF MENINGITIS.

By James Barr, M.D., Liverpool, England.*

ALTHOUGH the general principles of treatment which I hope to lay down in this paper may be applied to all forms of mennigitis, my observations will directly refer to simple meningitis, whether affecting the pia mater of the convexity or of the base of the brain. I shall, however, more especially exclude pachymeningitis externa, which to a large extent comes within the domain of the surgeon, and, although great strides have been recently made in brain surgery, not always with a very happy result. It might be reasonably supposed that tubercular meningitis, which is undoubtedly an inflammatory affection of the pia mater, would come within the scope of this paper; but we seem to be on the eve of a great revolution in the treatment of all tubercular diseases, so I may be excused from saying anything of my past experience in this subject. Moreover, tubercular meningitis has hitherto been looked upon as an almost necessarily fatal disease, and cases of supposed cure have been viewed with great suspicion. I can scarcely rank myself with those who estimate the mortality of this disease at one hundred per cent., as I have seen cases recover where I had diagnosticated tubercular meningitis, though, happily, I had no opportunity of verifying the diagnosis on which my gloomy prognosis was based.

During the last few years I have had under my care thirteen cases of simple meningitis, with one death. Of these, seven occurred in my hospital practice, and are recorded at the end of this paper. The other six occurred in private practice, and as I have not full notes of them they are not here used to increase the length of this paper. Of the private cases, the meningitis in four instances affected the convexity, and all made a perfect recovery; and in two cases there was basilar meningitis. One of these completely recovered, with the exception of slight internal squint of one eye; and in the other case complete blindness resulted. I think I may fairly claim that my treatment has been very successful; but I have no wish to make any statistical use of these cases, as no uniform plan of treatment was adopted throughout, and so far as drugs are concerned, there was considerable variation. In fact, the treatment was carried out from day to day as, in my judgment, the indications of the cases demanded, and as my education in the subject improved with increased experience.

For effective treatment we should arrive at an early and accurate diagnosis. This is not always an easy matter, and in many cases it requires a considerable development of symptoms before we can feel confident as to the exact nature of the case with which we are dealing. It would carry me much beyond my present purpose to do more than touch the fringe of this subject. There is one disease—typhoid fever—which even the most skilful diagnosticians sometimes mistake for meningitis, and my fatal case was treated as one of typhoid fever for five weeks before his admission to hospital. Even then we did not recognize that the patient was suffering from basilar meningitis until the symptoms had further developed, and it was only at the autopsy that we felt justified in saying that at no period of his illness had he had typhoid fever. It has been recently stated that the condition of the knee jerks enables us to distinguish typhoid fever from meningitis, broadly speaking, the knee-jerks being supposed to be absent in meningitis; but I am in a position to state that such is not the case. I have seen the knee jerks exaggerated, and even ankle clonus present in undoubted cases of meningitis, whereas it is only in severe cases of typhoid that these conditions appertain. If such observations be carried out for a more or less lengthened period of time, it will be found that the knee-jerks are much more variable in meningitis than in typhoid fever. In the latter disease the knee-jerks are much exaggerated in severe cases, and this increases with the progress of the disease, and is often accompanied by marked ankle clonus. In meningitis, on the other hand, the knee jerks and all the reflexes are apt to be increased during the hyperæsthetic stage, but when any cerebral effusion takes place, the knee-jerks are apt to be abolished, at least temporarily. As a diagnostic sign I attach far more importance to the hyperæsthetic condition itself, which, I may say, is invariably present in the early stages of meningitis, whereas in typhoid fever, although there is no abolition of reflex irritability, the patient is apathetic, and does not present any inordinate sensitiveness. In

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typhoid fever the urine with Ehrlich's test presents a red, ruby color, but a somewhat similar reaction has been observed in meningitis. The absence of this color-reaction might negative typhoid fever, but its presence would scarcely exclude meningitis. Without further divergence on the question of diagnosis, we will at once suppose that we have to deal with a case of meningitis. It is most important that the nature of the case should be thoroughly recognized as early as possible, and that a decided line of action should be adopted, as the brain is more sensitive to inflammatory disturbance than any other organ of the body.

The patient should be submitted to as little reflex disturbance as possible. He should be kept in a dark, noiseless room, so that as few nerve-impressions as possible should travel to the sensorium by either the eye or the ear. The very injurious effect of noise was well exemplified in our fatal case, where the severe exacerbation, which ended in his death, began on the night when a patient suffering from delirium tremens and carbolic acid poisoning was unfortunately admitted to the same ward. Due attention should also be paid to the cutaneous sensibility; when practicable, the patient should lie on a water-bed, and be lightly clothed. The room should be well ventilated, and kept at a uniform temperature of about 60° F.

There is no disease in which antipyretic treatment requires to be more promptly and efficiently carried out. Of all the means at our disposal for this purpose, I prefer a large ice-cap, or a cap formed of Leiter's tubing with a constant stream of iced water flowing through it, applied to the shaven scalp. The application of cold to the head not only lowers the general temperature, but also moderates the circulation within the cranium. Four of my patients—three of whom made good recoveries—were treated in the water-tank with decided advantage. The continuous immersion in water of 90° to 95° F. is a very effective antipyretic agent, and improves the vascular tone; but I do not attach so much importance to this method of treatment in meningitis as I do in typhoid fever. When it is adopted in meningitis it should be supplemented by the use of the ice-cap. The cold to the head should be continued until the general temperature has been for some time subnormal, and if any pyrexia should afterwards recur, it should be immediately combated by a resort to the ice-cap. I have very little faith in the use of the new antipyretic drugs in this disease, but I can see no objection to an occasional dose of antipyrin when the temperature is very high. For general use I much prefer the free administration of carbonate and acetate of ammonium. If there be any fear of the formation of thrombi in the cerebral sinuses, liq. ammon. fort., well diluted with iced water, may be given, or the patient may be made to inhale Dr. Richardson's preparation of ammoniated chloroform, which consists of equal parts of chloroform and absolute alcohol saturated with ammonia gas. I would be inclined to favor the use of antimonial wine where there was much vascular excitement.

In the early stage of the disease I have still some faith in the old-fashioned remedy of a fly-blister to the nape of the neck. In the later stage, where there was evidence of much cerebral effusion with general paresis, and perhaps subnormal temperature, it would be worth while to try the effect of liquor epispasticus painted over the whole scalp.

The bowels should be kept open throughout the illness, and of all agents for this purpose I prefer calomel. The vomiting is usually of cerebral origin, and any direct treatment to the stomach is generally of little avail; however, a sinapism to the epigastrium, and the internal administration of bicarbonate of sodium and sal volatile frequently do good. The hiccough, which occurs at a late stage, is best relieved by hypodermic injections of morphine or of morphine and atropine.

To relieve the cerebral excitement, sleeplessness, and general restlessness, I have gradually arrived at the conclusion that there is no drug equal to opium, very freely administered. A favorite combination with me, especially where the temperature is above the normal, has been equal proportions of Dover's powder and salicylic acid; 10 grains of each every three or four hours for an adult. This may be increased, or supplemented by an occasional hypodermic injection of morphine, so as to keep the patient as sleepy and quiet as possible without actually producing coma. When there is any tendency to constipation, a powder composed of 1 grain of opium and 1 grain of calomel may be given to an adult every three or four hours. In some cases morphine may be adjudged the better remedy, but whichever is given, there should be no timidity in its use. Contrary to what was formerly supposed, opium and morphine lessen the circulation in the cerebrum. When there is much cardiac excitement, with defi-

cient vascular tone, a combination of opium, digitalis, and quinine will be found useful. When there are convulsions, the inhalation of chloroform will prove efficacious.

In this disease I have now completely discarded bromide and iodide of potassium, while such drugs as chloral hydrate, sulphonal, paraldehyde, and urethan are with me discredited. Of course, in any case when there was reason to suppose that there was a syphilitic basis, I would employ iodide of potassium, or more likely some preparation of mercury.

With the use of local or general blood-letting in this disease I have no experience, and in those cases where such a course might be deemed advisable I would rather try the effect of antimony. Blood-letting would be useful in the early stage if there were violent action of the heart and increased arterial pressure, but such conditions do not often occur.

In basilar meningitis, where there is a tendency to bulbar paralysis, atropine in small doses should be frequently given.

The diet throughout should be of the blandest description, consisting chiefly of milk, farinaceous food, and butter. Alcohol in every form should be avoided.

The following cases were under my care in the Northern Hospital. For the notes of the cases I am largely indebted to our late and present house physicians, Drs. Milligan, Wallace, and Askin.

Case I. *Meningitis of the Convexity: Cure.*—G. S., aged 11 years. Admitted to the Northern Hospital, April 22, 1888, suffering from "fits." He is a thin, delicate-looking boy, and his mother states that he has never been strong. Some years ago he had a cough, but since then he has been fairly well, except that on one occasion he had a slight discharge from his ears, and about nine months ago he had a "fit." He has never had any injury to his head. Father and mother healthy; one sister suffers from consumption; another sister and brother are in good health.

He has complained of pain in his head for the past month, but little attention was paid to his condition until yesterday afternoon, when he had a "fit," and between eight o'clock this morning and the present time (2 P.M.), he has had five similar attacks. On admission he was seized with one of these attacks. He was lying quietly on the sofa, when he made a sucking noise with his mouth, and clonic spasms began in the muscles at the angle of the jaw on the right side. This continued for some time, and there were also occasional convulsions of the corresponding muscles of the opposite side, and of the sterno-mastoid and platysma myoides of the same side. During this fit the pupils were irregular,—the right contracted and the left dilated, but in subsequent attacks they were regular and contracted.

He was very irritable, and objected to being touched, and there was evidently some photophobia, as he lay on his side with his face turned away from the light, and he had his legs drawn up. It was also noticed that there was slight paresis on the right side of the face, and of the occipito-frontalis: as when he cried, the wrinkling was much more evident on the left side. There were no convulsions or paralysis of the limbs. The knee-jerks were well marked; plantar reflex present in both feet, but strongest in left. No ankle clonus. Between the fits he was very lethargic, but when roused up he complained of pain in his head, though this was not localized. There was no optic neuritis, and the fundus appeared normal. Tongue clean; he vomited; and during a fit his bowels acted twice. Temperature, 100°; pulse, 112. Thoracic and abdominal organs normal. He was placed on milk diet, ordered a powder consisting of calomel, 4 grains, and compound jalap powder, 20 grains; also 3 grains of potassium iodide, and 10 grains of potassium bromide every four hours. He had an ice-helmet applied to his head.

April 23.—He slept well last night, and had no convulsions. He still complains of headache, and is in a drowsy, apathetic condition. Urine acid, sp. gr. 1020; no albumen. Temperature normal, but in the evening rose to 100°; pulse 116.

April 24.—There is considerable improve this morning. Both optic discs are red, and the right has a deeply-marked cup in the centre. Hearing, smell, and taste normal. No paralysis of tongue or soft palate. Temperature normal, and afterwards continued so. From this time the improvement was steady, and on April 27 he was ordered a chop.

June 1.—He was discharged to-day quite well, except that there was still slight facial paresis on the right side.

Case II. *Basilar Meningitis: Cure.*—T. F., aged 18 years, brass-founder. Admitted to the Northern Hospital on the morning of May 22, 1888, in a semi-conscious state, having been found sleeping in the street. The previous history of the case, as after-

wards ascertained, would seem to be as follows: He had not felt well, and had suffered from a headache for the previous fortnight. About a week ago he was in the country, and fell asleep about 10 A.M. in the sun, and did not awake till 5 P.M. He was then unable to get up, was taken to a barn, where he had cold water thrown over him, and he vomited, and afterwards had no distinct recollection of what happened between this time and his admission to hospital.

On reception he was in a drowsy, stupid condition, and could only be roused up with difficulty. He was then very irritable, and resisted any interference. There was no paralysis, nor any convulsions. Pupils equally contracted, and sensitive to light. Bowels freely open; motions greenish. Temperature normal; pulse 116. Urine acid, sp. gr. 1013; a trace of albumen. Ice-cap applied.

May 24.—More intelligent. Countenance flushed, head retracted. No optic neuritis. Temperature rose this evening to 100.8° F.

May 25.—He has now one hand considerably swollen, and painful to the touch, and he complains that the other hand is painful, but it is not swollen. He is very irritable, and continually whining. His head is much retracted. Sordes on the teeth. Bowels loose, and motions offensive. Heart and lungs normal. His temperature reached 102° this evening. He was ordered a mixture containing salicylate and sulpho carbolate of sodium.

May 26.—Considerably weaker, but not delirious, and when roused speaks rationally. There is an eruption of herpes round the mouth, but no lung disturbance. Hands as before noted. He was immersed to-day in the tank; temperature of water 95° F. Patient's temperatures to-day, 101.6°, 100.8°, 100.6°, 99.8°.

May 27.—He appears better, and complains of hunger. Urine acid, sp. gr. 1021; no albumen. Slept well last night in the bath, and talks rationally to-day. Temperatures, 100.6°, 100.6°, 102°, 100.4°, 98.4°, 99°; pulse 88.

May 28.—He was much better this morning, and had a good pulse, but his temperature steadily rose during the day, the records being 99 2°, 99.6°, 100.4°, 101°, 102.4°, 102.4°.

May 29.—He passed a very restless night, and his temperature remained at 102.4° till 8 A.M., but it fell to normal at noon. After this it rose slightly, but only reached 99.6° at 8 P.M., and at midnight. His head was still retracted, but could be more easily extended. Left hand still swollen and painful. Pulse 88, slow, full, and regular.

May 30.—Slept well all night, and has taken food well. Temperature ranged from 98.4° to 99.6°.

May 31.—He looks and feels well. He was taken out of the tank at noon, and, as his temperature did not rise to any notable degree, he was not replaced. Temperatures, 99.4°, 99.6°, 99°, 99.4°, 100°, 99.8°.

June 1.—Slept well last night, and feels better. No swelling of hands, and free from pain. Temperatures, 99 4°, 99.4°, 99.4°, 99.4°, 99.4°, 99°. From this time his temperature remained normal; he steadily improved in every respect, and was discharged quite well on June 14.

CASE III. *Basilar Meningitis: Cure.*—A. A., aged 18 years, admitted to the Northern Hospital August 2, 1888, complaining of headache. He has frequently suffered from headaches, and has a neurotic family history. The history of the present illness is as follows: He had a headache when he left Montreal on July 24, but was better next day. On July 26 he was sea-sick, and then remained well until July 29, when the headache returned, and from this time felt feverish, but did not vomit. On July 30 he noticed that his speech was affected. During the last two days this has got worse, as also his headache. He has had no convulsions.

He is an intelligent, healthy-looking boy, with an obvious defect of speech. He drawls and pronounces his words badly, and this is especially noticeable when he attempts a sentence. He is rather drowsy. He says his sight is not so good lately, but he can see the time by a watch. Slight photophobia. Pupils equal and contracted. Optic discs and fundus normal. His hearing is defective, and he says there is a buzzing in his ears. There seems to be no derangement of sensation, and there is no loss of motor power. The plantar, epigastric, and cremasteric reflexes are normal, but the knee-jerks are absent. No ankle clonus. There is a cicatrix on the forehead and another at the vertex, the result of injuries in childhood. Tongue furred but moist; appetite bad; bowels were confined, but have been freely moved by an aperient. There is a slight cough, but no mischief can be detected in the lungs. Respiration 20. Heart's action strong and thumping; the sounds are loud and clear, and at apex first sound reduplicated. Pulse 100, regular, full, and bounding; skin hot and dry; temperature 104°

Urine contains a trace of albumen. He was placed on a milk diet, and had 15 grains of antipyrin. Ordered liq. ammon. acetat., 3iii., sp. etheris nitros, 3ss. every fourth hour.

August 3.—He is in much the same condition as yesterday. He complains of difficulty in swallowing. There is considerable pain and tenderness over the abdomen; bowels not moved since admission; tongue furred. Temperature 104.2°. Ordered pil. colocynth. et hyrs., grs. x.

August 4.—Slight ptosis of left eyelid. Vomited; delirious and drowsy; pulse 116; temperature 104° in the morning, but fell to 102° in the evening. Urine drawn off; slightly albuminous. Ordered potass. iodidi, grs. x., thrice daily.

August 6.—The ptosis of left eyelid not noticeable. Still drowsy, but not delirious. Urine and fæces passed involuntarily. Temperature, M. 100°; E. 103.2°; pulse 130.

August 7.—Looks rather better and speaks more plainly. His bowels are open, and he has passed urine voluntarily. Temperature, M. 101.8°; E. 102.8°; pulse 114. Urine alkaline, sp. gr. 1026; a trace of albumen.

August 11.—The slight improvement has been maintained since last note, and his temperature has slightly fallen, the records to-day being M. 100°; E. 100.6°; pulse 106.

August 16.—He is deaf and drowsy; sleeps well at night. In addition to 10 grains of potassium iodide, he is now ordered 20 grains of potassium bromide thrice daily.

August 25.—There has been very little alteration in his condition since last note, and to-day he was immersed in the tank at a temperature of 95°. From this time he steadily improved, and by the 27th his temperature was normal. He was taken out of the tank on August 30. For the next few days the temperature fluctuated one or two degrees, and on September 2, 3, 5, 6, and 7 he had a rigor with considerable elevation of temperature, but it was quickly lowered on each occasion by 10 grains of antipyrin, and it was not deemed necessary to put him again in the tank.

September 6.—There was first noticed to-day a slight return of the knee-jerks. From this time the progress was satisfactory, and he was discharged on November 26 quite well.

CASE IV. *Meningitis of the Convexity and Bronchitis: Cure.*—H. B., aged 49, carter. Admitted, under the care of Dr. Barr, January 3, 1889. A short time previously this patient was in the surgical side of the Northern Hospital, suffering from injuries to his head, caused by a fall of thirty feet. After his discharge he suffered so much from headache that he returned to the hospital on January 2, and was transferred to the medical wards on January 3, on account of convulsions. He was then in an extremely irritable condition, and would not allow himself to be examined. There was marked photophobia. Tongue dry and furred; breath offensive; bowels constipated; urine alkaline, sp. gr. 1018; a trace of albumen; urea 1.9 per cent. temperature 100°.

He was troubled with cough, and there were bronchial râles over chest. He was ordered croton oil, to have his head shaved and an ice-cap applied, and a blister to nape of neck; to have an ammonia and senega mixture for his cough.

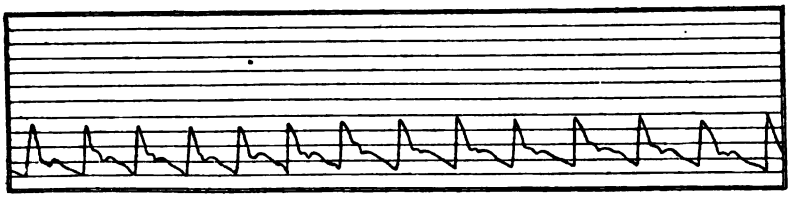
January 8.—He is much better, and now quite sensible. There is a large ulcer on left side of tongue, caused by a bite during the convulsions. Ordered a mouth-wash. Tongue clean, and cough much better.

January 16.—Discharged quite well.

CASE V.—In the *Lancet*, March 15, 1890, I recorded a severe case of typhoid fever, complicated with cerebro-spinal meningitis, and double otitis media. She was immersed in the tank for eleven days, had the ice-cap applied to her head, and was treated with opium and salicylic acid. She made a good recovery.

CASE VI. *Basilar Meningitis: Death.*—J. M., joiner, aged 29. Admitted to the Northern Hospital September 8, 1890. He is a rather spare, nervous man, but has enjoyed fair health, with the exception of one attack of erysipelas and iritis about five years ago. Last February he had orchitis. His present illness began about five weeks ago with headache, pains in the back and right groin. He was going about for a fortnight, but for the last three weeks he has been confined to bed. He had diarrhœa at the commencement, and it returned again about ten days ago. He was sent in, supposed to be suffering from typhoid fever, though on admission the evidence on that head was slight, and it was decided that, if he had had that disease, he was then recovering from it. Temperature 101° F. Tongue moist, coated in centre with a thick, dirty-white fur; tip and edges clean. Appetite fair; bowels confined, and when moved with an enema, the motions were passed, dark brown in color, and alkaline in reaction. The following morning it was noted that he had slept badly during

the night. Temperature has fallen to normal; pulse 96, full, soft, and compressible; heart-sounds normal; respiratory murmur feeble; no abdominal distention or tenderness, and no increase of splenic dulness. The glands in right groin were large. Plantar reflexes and knee-jerks present; ankle clonus on left side. Urine acid, sp. gr. 1020. No albumen; did not give a red



ruby color with Ehrlich's test. He was placed on bread and milk diet, and ordered 10 grains of citrate of potassium every four hours.

September 18.—This patient has progressed favorably since admission. His temperature has ranged from 98° to 101° F., the mean of fifty observations being 99.26°. Pulse ranged from 80 to 96. At this time the hospital was very full, and unfortunately, on the night of the 18th, there was a patient suffering from delirium tremens and carbolic acid poisoning admitted to the ward where this patient was situated; consequently he had a sleepless night, and about 9.30 the following morning he had a rigor, and soon afterwards vomited. At noon his temperature was 104.8°; pulse 120; respiration 26. Complains of headache. He was ordered an enema, which produced two free evacuations. Temperature, 2 P.M., 102°; 4 P.M., 101°; 8 P.M., 102°. A dose of nepenthe.

September 20.—Did not sleep well last night, and complains of severe headache. Vomited. Breathing feeble on right side, but otherwise no phenomena of lung mischief. No abdominal pain or tenderness. Pulse 108; temperature, 4 A.M., 99.6°; 8 A.M., 99°; noon, 101°; 4 P.M., 101.6°; 8 P.M., 100.8°. He was ordered a bismuth mixture, and at noon had 8 grains of antipyrin.

September 21.—He did not sleep at all last night, although he had 1 drachm of bromidia. He complains of very severe headache. Temperature at 4 and 8 A.M. was 100°. He then had a rigor, and at 8.15 A.M. it was 102.2°; at 9 A.M. 104°; 10 A.M., 104.8°; 10.30 A.M., 103.8°. He had 8 grains of exalgine, and afterwards 10 grains of antipyrin. At 2 P.M., temperature 102.4°; pulse 124. He was now in a semi-conscious condition, would not answer questions or put out his tongue, but was irritable, and resisted any interference. Sordes on teeth. There is still ankle clonus on left side, but knee-jerks are not well marked. He was now ordered a dose of calomel, and placed in the tank, the temperature of the water being 90°. Soon afterwards he became partially conscious, put out his tongue, and answered questions, but did not seem to know that he was lying in water. The following are the temperature records of to-day: 4 P.M., 100.4°; 8 P.M., 102.4° (in rectum); 10 P.M., 99.7°.

September 22.—Temperature at 1.30 A.M. 99.4°; but at 3.30 A.M. it was 102.6° in rectum and 101.6° in mouth; at 8 A.M. 101.8° in mouth. He passed a very restless night, notwithstanding two 10 grain doses of Dover's powder, and did not sleep till 2 A.M. He then slept quietly for some hours with his eyes half open, and afterwards felt much better. He was quite conscious and, he said, quite free from headache, except when he moved; tongue moist and only slightly furred; pupils rather contracted; pulse 88, soft and full; respiration 20; bowels confined, and although he had two ounces of castor oil to-day, he had no motion till the following morning, when it was dark and formed. He was now ordered an ice-helmet.

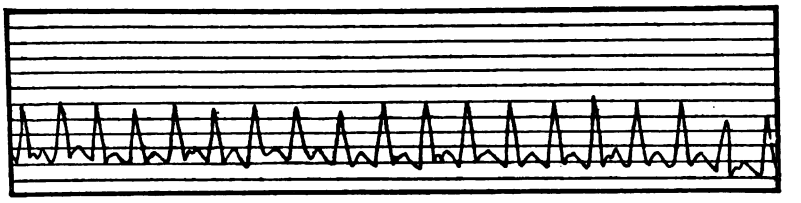
September 23.—He had a sleepless night, although he had 30 grains of Dover's powder. He is quite conscious, says that he is now free from headache, but feels that very little would bring it on. Tongue moist; pulse 84, stronger; pupils contracted. Ordered 10 grains of Dover's powder every four hours. Temperatures to-day, 99.8°, 99.2°, 99°, 100.4° (when out of the tank while it was cleaned), 98°, 99.6°.

September 24.—He had a better night, sleeping for several hours at intervals, with his eyes half-open. He was occasionally delirious, and shouted a good deal. During the day he slept quietly, but when awake he shouted, muttered, and talked to himself. When spoken to he answered intelligently. Herpetic eruption on lips. Pulse 104; pu-

pils contracted. He has taken nourishment very freely since he was placed in the tank. Bowels freely moved. Temperatures to-day, 98.8°, 98°, 97.8°, 99.2°, 99°.

September 25.—He had a very restless night, was very delirious, and shouted all night. Quite sensible when spoken to, but he is constantly muttering to himself. He says he has no headache. There is, and has been for last two days, well-marked muscular tremor, and the patient shivers, but he says that he does not feel cold. The temperature of the tank is now raised to 96°, but the ice-cap is continued. Temperatures, 97.8°, 98.4°, 99°, 98.4°, 98°, 100°.

September 26.—He did not sleep at all last night, although he had chloral and bromide in addition to the Dover's powder. He was restless and delirious. He had also a hypodermic injection of $\frac{1}{8}$ grain of morphine, but it had no effect. Temperature, 4 A.M., 99.6°; 8 A.M., 99°; noon, 99.2°; pulse 124 (see tracing).



As it seemed almost impossible to get him to sleep, and as the progress was not satisfactory, he was taken out of the tank at 5 P.M. The ice-cap was continued to the head. At 5.45 P.M. his temperature reached 100.8°. He then had 15 grains of antipyrin, which caused profuse diaphoresis. At 7.30 P.M., temperature 100.6°; pulse 160. The shivering stopped after he was put to bed, but his other symptoms became worse. Dr. Barr examined him at 8.30 P.M., and found commencing double optic neuritis, knee-jerks exaggerated, ankle clonus on left side. Temperature 101.4°; pulse 156. He got 18 grains of antipyrin at 11 P.M. No sleep to-day.

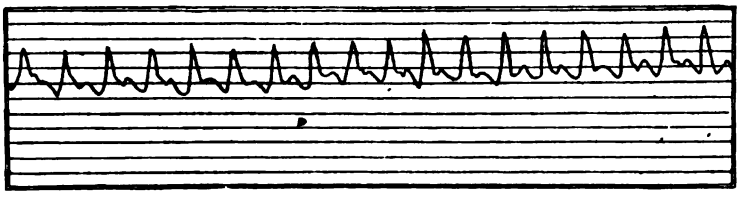
September 27.—He had one drachm of paraldehyde last night in addition to his Dover's powder, but he did not sleep. He was very restless, lay with his eyes widely open, tossed his arms about, grasped at imaginary objects in the air, and was muttering. Bowels acted twice involuntarily; motions brown and offensive. Had hiccoughed several times during the night. Temperature, 2 A.M., 99.2°; 2.30 A.M., 99.8°; 4 A.M., 101°; 6 A.M., 101.6°; 7.40 A M, 102°; pulse 150; urine 102.2°; pulse 172; tongue dry and furred; teeth covered with sordes; pupils dilated from the effects of atropine; urine and fæces passed involuntarily; motions loose, brown, and very offensive. He was now ordered 15 grains of salicylic acid and 10 grains of Dover's powder every three hours. He lay wide awake, and his appearance was not unlike that of delirium tremens. To try and induce sleep, chloroform was administered, but it was very difficult to get him under its influence. At 10.30 P.M. Dr. Barr prepared Dr. B. Ward Richardson's ammoniated chloroform, and administered it by inhalation. It at first seemed to irritate him, but after inhaling it for about an hour, he was pretty well under its influence, breathing deeply, with eyes partially closed and pupils contracted. Temperatures, 101°, 102°, 102.2°, 100.4°, 100.2°, 99.8°, 101°.

September 28.—From 12.10 to 2 A.M. slept very well; he then had two feeders of milk; bowels and bladder acted involuntarily. He had several short sleeps under the influence of ammoniated chloroform. His arms twitched convulsively, and every now and then the left side of the body gave a convulsive jerk. There were several involuntary evacuations of light-brown, offensive fæces during the night. 10 A.M.—Is quite conscious, but restless; tosses his arms about; dorsal decubitus; pulse 128; knee jerks present, but less marked than two days ago; ankle clonus present. During the day there was a slight improvement, and he passed urine voluntarily twice. Temperatures, 100°, 100.4°, 101°, 99.2°, 99°, 99.2°; pulse 132 (see tracing). Ordered 1 grain of calomel to be added to each powder.

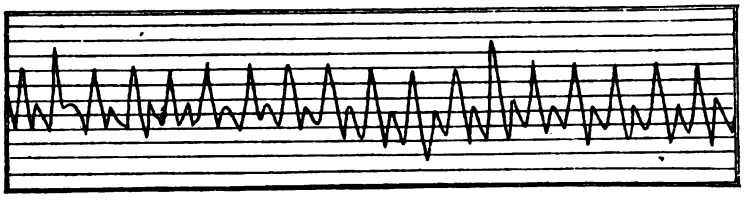
September 29.—He had several short sleeps without any ammoniated chloroform, and seems rather better this morning. He says he feels better, and he is quieter, but his hands and arms are still moving a little. Tongue dry and fissured; pulse 132; ankle clonus present; knee-jerks not well marked. During the day he became worse, did not sleep, and was very restless. At 4 P.M. he was replaced in the tank at a temperature of 95° F.; he then slept from 4.15 to 8.30 P.M

Temperatures to-day, 99°, 101°, 101°, 100°, 99.4°, 98.6°.

September 30.—Had several short sleeps during the night under the influence of his powders and ammoniated chloroform. Tongue



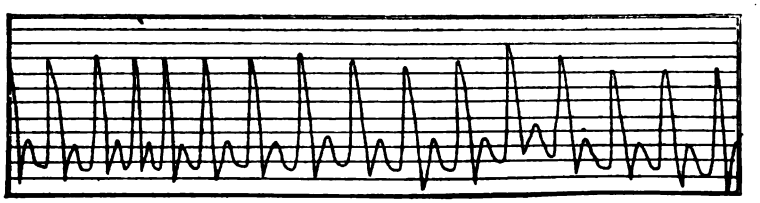
not so dry; pulse 120, stronger; motions loose, yellow, and offensive; pulse 124. Mr. Walker examined optic discs and found them fluffy.



October 1—Sensible this morning; pupils normal; pulse, 132; temperatures, 99.8°, 98.8°, 98 4°, 99.2°, 98.4°.

October 2.—Had ammoniated chloroform three times during the night, and slept about six hours. Is sensible, and says he feels better. He got rather worse in the afternoon, and was much troubled with hiccough. Dr. Barr found both optic discs very ill-defined, and veins much enlarged. Temperatures, 97.8°, 98.8°, 99.2°, 99°, 99.6°, 100°.

October 3.—He was not so well this morning, and was much troubled with hiccough; but he showed signs of improvement in the afternoon. Mr. Walker examined his optic discs, and found the veins enlarged and arteries obscure. Pulse 108; temperatures, 99.4°, 98.2°, 99.4°, 98°, 99.8°, 99.6°.



October 4.—Not so well to-day; not so sensible; tongue moist; knee-jerks exaggerated, no ankle clonus; muscular tremor well marked; hiccough troublesome, and he yawns frequently. Temperatures, 100°, 100°, 98°, 99.4°, 101°

October 5.—Slept about four hours last night. He vomited this morning, and hiccough troubled him occasionally during the day. Temperatures, 99.2°, 99.2°, 99°, 97°, 98.2°, 100.2°.

October 6.—I made the following note:

"A daily record of the progress of this case has been fully noted by Dr. Askin, but a few general impressions may be now recorded. The condition of the patient has been extremely variable,—at times fairly sensible, and correctly answered all interrogatories, while soon afterwards he would relapse into a state of stupor from which he could be barely roused. Last two days his mental condition has been almost a total blank, but lately there seems to be a very considerable improvement. What is now specially noticeable is that the general venous turgescence and hyperæmic condition of his head, which uninterruptedly continued from the beginning of illness till lately, has now to a great extent disappeared. The tâche cerebrale is even now, and has been throughout, well marked. The hiccough, which began about four days ago, is still very annoying, and has not been much relieved by the medicines which he has received. The condition of the tongue has been somewhat variable; but on the whole has been fairly moist, and only slightly furred. The general hyperæsthesia has been lately less marked. At one time he was so sensitive that he could be barely handled or temperature taken in

rectum without making him shout and complain of pain. The general muscular tremor and reflex irritability are now less marked; still it is difficult to take a sphygmographic tracing owing to the jerking of his arm. The ankle clonus has now disappeared, and patellar reflexes are very much less marked. The reaction of the triceps muscle of the arm, which at one time was very marked, has now disappeared. His heart's action is and has been fairly strong throughout. The pulse has been extremely variable, the frequency varying every few seconds, and from time to time the number of beats frequently differed from 20 to 30 in the minute. The breathing has been occasionally frequent, but there have been no marked chest symptoms. The splenic and hepatic dulness are about normal. Abdomen, if anything, is rather retracted. The urine, when examined, has been found free from albumen, with one exception, and did not give Ehrlich's test. Mr. Walker has again examined his eyes. Left disc much better defined; disc somewhat woolly. The border of disc in right eye is by no means defined yet. The pupils have been contracted throughout, except when under the influence of atropine."

At 11.20 P.M. he had a fit of coughing which lasted till 12.20 A.M., when he died from asphyxia.

Post-mortem.—J. M. died October 7, at 12.30 A.M.; autopsy, 3 P.M. Height, 5 feet 7½ inches. Rigidity present; lividity of dorsal aspect. Body presents the appearance of that of a well-developed, but not very muscular, man; it is considerably emaciated, but not extremely so. The abdominal cavity is not distended. The skin of hands and feet is macerated from immersion in the tank. The only other noteworthy external appearance is a clean-shaven scalp.

On removing the calvarium the dura mater was found adherent to the skull at several places, and there was general turgescence of the veins. In the longitudinal sinus there was a long, thin, partially-decolorized clot. The vessels of the pia mater were all much congested, giving the whole surface of the brain a purplish appearance. The veins in the sulci are full, and many of them contain fine fibrinous threads of decolorized fibrin. Over the frontal lobes there are many small patches of lymph. At the base, the circle of Willis, the whole of the pons, the medulla oblongata, and about one-third of lower surface of the cerebellum are covered with a thick layer of lymph. On cutting through substance of brain the punctæ hæmorrhagicæ are large and numerous. The lateral ventricles are distended—especially the descending cornua—and are filled with dark sanious fluid containing considerable quantities of lymph; the two choroid plexuses are covered with flakes of lymph. The third ventricle is filled with sanious fluid containing considerable quantities of lymph. The iter e tertio ad quartum ventriculum is dilated. The whole medulla oblongata is bound to the cerebellum by a thick layer of lymph. The fourth ventricle is filled with thick, grumous fluid, and its floor is very much injected. The brain-substance surrounding the lateral ventricles is rather soft, and the corpus callosum seems somewhat diffluent, but otherwise the brain-substance seems of normal consistence. The cerebellum is normal.

On laying open the chest and abdomen there was a thin layer of subcutaneous fat. Both lungs were bound to chest walls by numerous pleuritic adhesions. The left lung weighed 28 ounces, the posterior aspect being conjested and very œdematous, and the lower part of upper lobe collapsed; otherwise lung-structure healthy. Right lung weighs 38 ounces; posterior aspect, which lies in vertebral groove, is semisolid and very œdematous; the anterior portion, comprising the whole of middle and greater part of upper lobe, is very œdematous, but otherwise the lung-substance is healthy. The trachea and larynx are much injected, and contain large quantities of frothy fluid.

Heart weighs 11 ounces when free from clot. The right auricle and ventricle are distended with fluid blood and partially decolorized clot. The left ventricle and auricle only contain a small quantity of fluid and some partially decolorized clot. Valves and heart muscles normal.

Liver, pale-yellow color and greasy to touch. Two kidneys weigh 11½ ounces; structure healthy. There is a small quantity of fat in omentum and mesentery. The small intestines are rather distended, walls thin. On careful examination of the whole bowel no ulceration could be detected. Peyer's patches not visible. Large bowel quite normal.

CASE VII. *Basilar Meningitis: Cure.*—H. H., aged 23, clerk. Admitted to the Northern Hospital, October 12, 1890. He was sent in by Dr. Gormley, with whom I saw him the previous night, and obtained the following history: The patient had been out of work for some time, and his landlady noticed that

he had been falling off in flesh for the last five or six weeks. For last eight or ten days he had complained of tingling sensations in his hands and feet. On October 5 he had an attack of convulsions, and has since been troubled with muscular twitchings. On October 8 he took to bed. When I saw him he was in a semi-conscious condition, and did not understand anything which was said to him. He was sensitive to painful impressions. Knee-jerks could be scarcely elicited. Temperature, 99.2° F.; pulse 60, slow and full. Ordered an ice-cap, a blister to nape of neck, and a dose of calomel.

October 12.—Very stupid, but puts out his tongue when told to do so. Lies with his eyes open; pupils dilated. Pulse 72, slow and full; temperature 98.4°–99°; tongue clean. Bowels opened with a dose of sulphate of magnesium. Ordered ½ grain of opium and 1 grain of calomel every four hours. Milk diet.

October 13.—Very listless, and does not seem to clearly understand any questions, but shows a disposition to be cross. Pulse variable; at one time ran up to 148; temperature 99.4°–100°. He did not sleep at all last night, although he had a dose of nepenthe in addition to his opium and calomel powders. Knee-jerks barely noticeable. Between 5 and 6 P.M. he had five convulsive seizures. He had 5 grains of calomel, and blister to neck.

October 14.—He did not sleep in the early part of the night, but at 1.45 A.M. he had a hypodermic injection of ⅙ grain of morphine, after which he slept quietly, with his eyes half-open. He keeps picking at his nose and moving his mouth, but there has been no return of the convulsions. Tongue moist, coated with a grayish fur; pupils contracted; abdomen retracted; muscles tense and tender to touch. He resists manipulation, and holds himself stiffly while being examined. Plantar reflexes absent, but knee-jerks lively. Pulse 84–72; temperature 99.8°–98.4°; respirations 12. Bowels confined; dose of Epsom salts.

October 15.—In much the same condition. Temperature normal; pulse 88.

October 16.—He had a dose of laudanum, but did not sleep at all last night. Temperature normal; pulse 92. Bowels opened with an enema.

October 18.—He had a hypodermic injection of ⅙ of a grain of morphine at 11 P.M., and again at 3 A.M. After this he slept quietly with his eyes closed until 6.40 A.M.; passed urine involuntarily He seems easier this morning, but he is still sullen, restless, and frequently pulling the ice-cap off his head. Tongue moist, coated with a white fur; bowels moved with an ounce of sulphate of magnesium; abdomen retracted; knee-jerks present, well marked on left side; temperature 98.4°–99°; pulse 68.

October 20.—Had a good night. Bowels moved with Epsom salts. Temperature 98°; pulse 56. Dr. Barr found that both optic discs presented a reddish-gray appearance, and were slightly swollen; veins enlarged. His general condition is much improved.

October 21.—Did not sleep well. Temperature 98°; pulse 60; bowels freely open. From this time he steadily improved. The ice-cap was discontinued on the 25th. Mr. Walker examined his eyes on the 28th, and found his optic discs normal. He was placed on ordinary diet on November 19, and discharged quite well and in good condition on November 28, 1890.

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*CHRONIC URETHRITIS.**

By L. Bolton Bangs, M.D.,† New York.

THE purpose of this short paper is to suggest to you some topic for discussion, and I know of none which offers a better opportunity for the presentation of various views than that of chronic urethritis. Although it is an old and much-written subject, it maintains a position of interest to us as professional men, and continues to be the object of varied surgical effort. It yet stimulates the invention of operations, instruments, and injections.

Successive crops of our younger brethren return from Vienna year by year with Ultzman syringes; each crop enthusiastic about the result of injecting into the deep urethra and bladder varying solutions of alum, permanganate of potassium, carbolic acid, zinc, etc., and it has fallen under my observation to find all of these gentlemen in turn giving up these solutions in order to resort to other methods. Enthusiasm and disappointment seem to follow each other closely.

The enthusiasm is welcome and should be

* Read at the meeting of the New York Clinical Society, December 26, 1890.

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maintained, but it has seemed to me that we might be saved some of this disappointment and much waste of time if we were a little more discriminating and classified our cases more carefully.

It should be borne in mind that the same symptom, say, for instance, the morning purulent drop, with which we are all so familiar, is due to more than one cause, and its final cure may be the result of attention to many different conditions. Constitutional or vital, as well as local states, are important factors in the healing process in any region of the body, and must always be considered in relation to our topic. This may account for some of the discouragement which we have met in treating these cases in hospitals or dispensaries, for here it is well-nigh impossible to secure the conditions of time and attention which are essential. Indeed, there are some in which no permanent cure can be effected, excepting by a *persistency*, which implies that the patient shall be so managed as to maintain absolute confidence in his medical adviser, and be content to pursue—no matter how long the time may be—the treatment which has been laid out for him.

In many of these chronic cases the time of weakness is when the patient begins to rotate from one doctor to another. Each practitioner in turn studies the case, makes his diagnosis, and, so to speak, begins all over again. Thus we find patients who have been year after year under treatment but still have the gleet.

Many patients with chronic urethritis, if carefully examined, will be found to have stricture of large calibre, which in itself is an obstacle to the permanent healing of the mucous membrane; but it is necessary in some of these persons not only to radically remove the stricture or strictures if possible, but to treat the diseased membrane for an indefinite time after the stricture has been removed. Hence I believe that it is judicious and humane to tell a patient applying for relief from a chronic urethral discharge, and in whom stricture of large calibre is present, that after the operation upon the stricture it may be necessary to pursue some method for the treatment of his urethra, thus saving many individuals from the disappointment of finding that their discharge was not immediately cured by the operation alone.

In order to simplify this paper and limit its scope, I shall call your attention to only two or three points.

In illustration of the necessity for "persistency" and of treatment after stricture has been removed, I beg leave to narrate the following case:

This gentleman came under my care in June, 1886. He had had two attacks of gonorrhœa, the last one in 1881. Since then he has had more or less discharge. He had had varied treatment, but, in spite of all, his difficulty, consisting of a whitish drop, to be seen not only in the morning but during the day, persisted. He had strictures of large calibre at two and a half and at three inches from the meatus.

The endoscope, with electric illumination, easily revealed a chronic granular urethritis in the bulbous urethra, from which pus could be distinctly seen exuding. It was thought advisable to treat this diseased mucous membrane first, in order to avoid, if possible, the operation of internal urethrotomy. This was persisted in with some improvement, but with continual relapses, until the following February (1887), when, finding no further progress in his condition, I advised the division of the strictures, which was accordingly done, with the aid of cocaine. He was kept quietly in bed for six days, in order to foster the healing process in every way, but when he returned to his business there was immediately a very decided increase in his urethritis. This gradually subsided, however, without any special treatment, until he returned to his usual chronic condition of the morning drop of purulent matter.

After satisfying myself that his urethra was entirely free from stricture, I treated him most carefully and persistently (as you may judge) by means of the endoscope, until the granulations, which I have mentioned in his history, were entirely well. Notwithstanding this, the discharge continued. This led me to review his history, which developed the fact that at one time he had had some evidences of irritation of the prostatic urethra, and presumably of the membranous urethra, because it should be borne in mind that this disease travels backward by contiguity of tissue; and that, therefore, if the prostatic urethra is attacked, it may be assumed that the inflammation has travelled by way of the membranous. Although there were no special evidences in the discharge or urine, these regions were treated by the application of varying solutions of $AgNO_3$ until his sense of burning and tickling at or near the meatus had entirely disappeared. Nevertheless, the discharge persisted; he complained, moreover, of a burning sensation in the perineum,

which was especially aggravated after coition, and also by any condition of body which produced a urine of high specific gravity. Consultations with colleagues in regard to him did him no good. The examinations and suggestions were of no avail, and I simply made up my mind that it was necessary, in order to cure him, to fight it out according to my best judgment and with all the resolution that I could summon to my aid. Fortunately, he was a man of extraordinary good sense, and appreciated the difficulties of his conditions, was temperate and abstemious, and came regularly and systematically for treatment.

During this time, finding that there were no gonococci in the discharge, he was permitted to marry, and his wife has borne him one child. There was never the slightest infection of his wife or child, in regard to which I have been very cautious and have carefully inquired.

After obtaining a thorough knowledge of his urethra by the most careful and rigid inspection, I found that there was one particular spot which could only be brought into view by special manipulation of the endoscopic tube. A tube as large as the urethra would admit must be pressed firmly down into the bulb, the outer end depressed as if for the purpose of passing it on into the membranous urethra, so that the inner end would distend the bulb beneath the anterior layer of the triangular ligament, and in this way only could be brought into view a bluish-red spot of granulations, which were the cause of this man's tribulations. Solutions of $AgNO_3$, beginning with five or ten grains to the ounce, were applied at varying intervals of from one to two weeks. By close observation it was found that it was easy to overdo the matter in this case; that an application too strong or repeated oftener than once a week, or once in two weeks, would increase his discharge and put him back to a point from which it would again be necessary to advance him. It may be well to remark here that the applications to the deeper urethra could not be done in a hap-hazard or indifferent manner. With the finger in the rectum, the point of the syringe must be located directly upon the irritable or tender localities, and the instrument withdrawn gently and slowly, little by little, so that the solution could be applied minim by minim from one point to the other.

This man was continuously under my care up to this winter, when his discharge, which had gradually decreased in consistency and in the amount of pus which it contained, ceased entirely. At all events, he has been free from discharge, without relapse, for a longer period than ever before. It was only by attention to these details and by this persistency that this good result was obtained.

I will be glad to have any suggestions from this audience or any criticism upon the management of this case.

Again, there is a large class in which no stricture is present, but who have the same symptom,—*i.e.*, that of the morning drop,—which may readily be excited into a more abundant discharge by any act of intemperance or of sexual indulgence. In these, of course, the endoscope is again our reliable and effective means of ascertaining the condition of the urethra and of affording a way to treat it. But upon this it is not necessary for me to enlarge, for I assume that you are familiar with this instrument and also with the appearance of the urethra in its different parts. There is, however, another class of cases who have never had any tangible discharge from the urethra, but who suffer from symptoms of varying kinds of greater or less intensity, and whom we have been accustomed to place among the "neurotics," "hypochondriacs," etc., or perhaps have referred their symptoms to other causes. In my opinion these persons have a form of chronic urethritis, which, if recognized, will modify and facilitate treatment. Take, for instance, the following case:

A gentleman of 48 years of age, who has always been temperate, and who never had any venereal disease. About three years before coming under my care he had been circumcised for feeble erections, premature ejaculation, and for a "great sense of discomfort or burning," as he described it, somewhere in the deep urethra. The most careful examination failed to find any strictures. He had no hemorrhoids or any source of irritation about the anus or rectum; but his feeble erections, premature ejaculation, and the sense of burning and discomfort were still present. Repeated microscopic examinations of his urine were negative as to any organic evidence of prostatic trouble. But, as he had large deposits of uric acid crystals in his urine, I concluded that, given a man of nervous temperament and irritating urine, there was probably a sufficient degree of prostatic urethritis to account for his symptoms. Upon this hypothesis I proceeded to treat him. The passage of sou

gave him comparative relief and some slight return of vigor in his erection. The correction of his urine aided somewhat, but still he had frequent relapses, and the burning and discomfort persisted. Applications of $AgNO_3$ to the prostatic urethra seemed to help also, but there was still a persistency of his symptoms, which led me to explore the deeper parts of the bulbous urethra with the endoscope. Here, much to my surprise, because he had never had any urethral discharge, or any evidence whatever of antecedent acute urethritis, were distinctly seen granular, bluish-red patches of irregular size. As cocaine was not used, these were found to be exceedingly sensitive; so sensitive that he could scarcely endure the gentle cleansing with soft pledgets of absorbent cotton, which was necessary in order to make the diagnosis definite.

Here, then, was the explanation of the continuance of this man's symptoms. I obtained from him a history of long and fatiguing horseback rides, for he had been a brigade commander during the war, and also an indefinite recollection that his troubles had begun somewhere about that time. Suffice it to say, seven applications of $AgNO_3$, not stronger than ten grains to the ounce, repeated at intervals of a week, together with one application of a few minims of a five-grain solution to the prostatic urethra, which, bear in mind, I had done before without avail, cured him. So far (six months) there has been no relapse.

You will observe, then, the order of events in this patient. No acute inflammation, but a subacute and chronic form of inflammation of the bulbous urethra, excited, no doubt, by the traumatism of a "life in the saddle," had disturbed the nerve relations of these parts to such a degree that his marital intercourse was imperfect, and he was kept in a constant state of irritability by small but persistent symptoms, and he was not relieved until this was discovered, and when discovered was rapidly and brilliantly cured.

In order to emphasize the necessity for classification, and to confirm the class which I have endeavored to establish,—*i.e.*, that there may be chronic urethritis, without antecedent or present discharge,—permit me to narrate the following:

This is a gentleman, aged 54, happily married, and has had several children. He remembers that about thirty years ago,—that is to say, when he was 24 or 25 years of age,—he had an attack of frequent urination, and that after urinating he had a sense as if there was more urine in the bladder. This disappeared, and he had no trouble until the year 1888, when the same thing made its appearance again. He was examined by a distinguished surgeon of Philadelphia, who found no stone nor any residual urine, and advised him to have large sounds introduced. This was done, but his urethra was so sensitive, and he suffered so from the first attempt, that thereafter the sounds were passed under the anæsthesia of nitrous oxide gas. The passage of sounds made him worse, and his attacks of frequent and slightly-painful urination recurred so often that his life was miserable, and he was also incapacitated from attending to his business. He gave me a perfectly straightforward history of masturbation occasionally from boyhood up to twenty-four years of age. He had never had illicit intercourse, but just before the first one of these attacks—thirty years ago—he admitted having had prolonged sexual excitement in relation to a young lady to whom at that time he was very attentive. This sexual excitement was frequently repeated, and was soon followed by the symptoms of which he complained. He married in about a year after, and his married life has been physiological and satisfactory.

When carefully examined, his urethra was found to be entirely free from stricture, but the prostatic urethra was excessively sensitive. Gentle pressure upon it by the rectum made him cry out, and some seminal fluid escaped from the meatus. He had no residual urine. He was a man in excellent general health, temperate in all his habits, in very comfortable circumstances, and he was at a loss to account for this recurrence of the symptoms after so many years.

Examination of his urine at repeated intervals showed a very decided tendency to lithæmia, and I obtained from him the history of an attack of nephritic colic and the passage of gravel in May, 1887, about a year before this present trouble began.

The endoscope, when introduced into the bulbous urethra and manipulated as I have described to you in the first case, revealed a mucous membrane decidedly hyperæmic in irregular patches. These were treated with applications of $AgNO_3$, five grains to the ounce, and almost immediately—*i.e.*, after two applications—my records say that he was "very comfortable," but an attack of cold, with "aches and pains all over," producing a condition of urine of high specific

gravity, caused a relapse in his symptoms. During this attack I made no application to his urethra, but gave him salicylate of sodium internally. After a few days of this treatment I again explored his urethra with the endoscope, and had the satisfaction of seeing the patches to which I have referred, and which had become pale and almost level with the surrounding urethra again, bluish-red in color, and distinctly elevated. Treatment was resumed, with the same happy result of rendering him immediately less irritable and with no complaint in regard to his bladder. This gentleman entirely recovered, but he evidently has a constitutional tendency to lithæmia, and if his urine becomes loaded with crystals, it immediately irritates his mucous membrane, and he has a return of his old sensations to a moderate degree. For months I have not been obliged to make any application to his urethra, but have relieved him by attention to his diet, by encouraging a little more exercise in the open air, and by the exhibition of alkalies between his meals.

The points in this case are somewhat similar to the other, but permit me to call your attention to what seems to me to be its order of events.

The habit of masturbation induced a hyperæmia of the bulbous and prostatic urethra. This was aggravated and intensified, by the sexual excitement of early manhood, up to the grade of a mild inflammation, which was manifested by the frequent and painful urination. Marriage relieved him, but later in life the uric-acid urine again irritated his "weak spots," and again a mild form of inflammation appeared, which was proven by ocular inspection and by the presence of a few leucocytes in his urine. The nervous element was now, at his age, a prominent feature, and he suffered more and more persistently, notwithstanding the internal medication, diet, etc., till the local conditions in the urethra were ascertained and treated.

31 East Forty-fourth Street.

CARBOLATE OF CAMPHOR.

By M. B. Cochran, M.D., Iowa City, Iowa.

In the December number of the Gazette for 1887, I called attention to a mixture of Japan or laurel camphor and crystals of carbolic acid, under the above name, and gave some account of the therapeutic uses to which I had applied it. Dr. Th. Schaefer called attention to this preparation in 1885, under the name of "phenol-camphor," and used it as a local anæsthetic in odontalgia, introducing it, on cotton, into the cavity of a carious tooth; also as an anæsthetic in ingrowing toe-nail. He also used it in certain cutaneous eruptions, due to cryptogamic causes.

The above is the only notice of it, so far as I am aware, until my article appeared in 1887, and at that time I had not seen the article of Dr. Schaefer. Since that time, however, I have seen various notices of it in different medical journals, and accounts given of the uses to which it has been applied. I prepare it by adding one part by weight of carbolic acid to three parts of camphor, setting it aside for twenty-four hours, and straining through gauze. It is a permanent liquid, having a specific gravity of 990. It is thoroughly antiseptic, and possesses unsurpassed germicidal powers. I dipped a piece of fresh meat (beef muscle), a square, weighing about two ounces, in carbolate, and then placed it in a bottle, closing the mouth with cotton, then placing the bottle in an east window, so that it was exposed to the sun's rays from the first of June until August, or until it was dry. No odor or indication of putrefaction was at any time perceptible. I impregnated gauze and cotton with it, and used it as a dressing for wounds after operations. It prevented suppuration in every instance when it could be well applied, but I found that if applied to the skin for several days without dilution it gave rise to an eruption of the surface, and that it was necessary to mix it with oil for continued external use. I have injected it with a hypodermic syringe into acute abscesses or boils with the effect of aborting them if suppuration had not begun, and of relieving the pain of them in every instance.

When a few drops are injected under the skin, it produces complete anæsthesia in the immediate parts which lasts for several hours. Some soreness of the surrounding parts follows, but no abscess. A sharp smarting is felt at first, which only lasts a moment. A little ether or alcohol (pure) should be added to it for hypodermic use, so that it will readily flow through the needle. It combines readily with alcohol, ether, fixed and essential oils, and petroleum derivatives, but *not* with aqueous solutions or *glycerin*.

It readily dissolves menthol, cocaine, sali-

cylic acid, iodoform, chloral hydrate, and mercuric chloride.

When given internally in capsules, in doses of from 5 to 10 drops, it produces a sensation of warmth of the stomach not disagreeable, and giving rise to camphoric eructations, which continue for from one to three hours. When applied to inflamed or ulcerated mucous surfaces, such as the tonsils, pharynx, or cervix uteri, it causes smarting for a moment, and then relieves existing pain, and acts as an antiseptic stimulant.

When rubbed upon the skin, it produces an agreeable warmth of the surface that continues for a considerable time.

When mixed with an equal quantity of cotton-seed oil, it forms one of the most agreeable antiseptic dressings to incised, lacerated, or contused wounds that I have ever used, preventing suppuration always. When properly applied upon gauze or absorbent cotton and kept in contact with the wounded tissues, and when suppuration has set in, it changes the character of the discharges completely, destroying all fœtor if well applied, and relieving pain and soreness sooner than anything that I have ever used. As a lubricant in massage, it is unsurpassed, especially in contracted muscles and stiffened joints. In herpes and erysipelas, when applied to the diseased skin with a soft brush, it has acted as a specific, relieving the pain and causing a healing process to be set up at once. In one case of the latter affection in a child 3 or 4 weeks old, that seemed about hopeless, I was called in consultation, and advised the use of one part of carbolate and *two* parts of pure olive oil, brushed over the face every three or four hours. The whole upper part of the face was so swollen that the ocular spaces of the face were full, the eyes had not been seen for two days, and the lips were so swollen that it was fed its mother's milk with a spoon, in very small quantities, and the disease was advancing over the scalp. The disease was checked from the first application, and in twenty-four hours a marked change had taken place for the better, and continued to recovery. In vaginitis, vulvitis, and pruritis vulvæ, when applied to the vagina on cotton, which is kept in place for twenty-four hours, it relieves the distressing symptoms at once. After parturition, if a small quantity is poured on the cloths that are applied to the vulva to take up the discharges, it will destroy all disagreeable fœtor and relieve the soreness in very little time. Of course strict cleanliness should be observed, and changes made as often as necessary. In cases of frost-bite, applied on cotton to the injured surface, and changed as often as needed, it is unsurpassed. It relieves the pain and dries up the blistered skin. In fact, it can be applied anywhere when an unirritating antiseptic dressing is required. I have used it uncombined in capsules, in cases of gastric and intestinal catarrh, with the best results.

In the London *Medical Recorder*, Dr. R. S. Smith reports two cases in which he used it, first, as a subcutaneous, and then as an intrapulmonary, injection in phthisis. He injected from 10 to 20 minims of the carbolate of camphor into the apices of the lungs, repeating it at first every two or three days, and afterwards daily.

He first used subcutaneous injections, but the patients preferred to have them injected into the lung-tissue, as it was less painful. About fifty injections were used in the course of ten weeks in the first case. In the second, the whole quantity injected in twenty-five days was 245 minims, 60 minims having been diffused in the diseased tissue of the right lung. A slight rise of temperature was observed after the injections in one or two instances, but no other evidence of irritation was noticed. Both cases improved greatly under treatment.

I use it in preference to anything else to render instruments aseptic before using them. It does not corrode steel, and covers the surface completely, if they are immersed in it when free from moisture.

INTESTINAL PILLS.

By Wm. H. Flint, M.D., New York.

ABOUT six months ago I addressed an inquiry to Messrs. Parke, Davis & Co., of Detroit, Michigan, concerning their ability to prepare pills in such a way that they should pass through the stomach undissolved, and should yet be disintegrated by the alkaline juices of the duodenum.

In response to my request they have kindly furnished me large numbers of pills which I have thoroughly tested, both in my private practice and in the hospital with which I am connected in the capacity of attending physician.

Creosote was selected as the active constituent of these pills, because, at the time

when my request for this preparation was made, I was deeply interested in investigating the effect of creosote in *phthisis pulmonalis*.

It seemed to me that the best results were obtained, in phthisis, from the action of creosote when it was administered in the largest doses which the individual patients could respectively tolerate. Since, however, many consumptives have notoriously feeble stomachs, which soon rebel against large doses of creosote, the desirability of distributing the labor of their solution and absorption over a larger part of the digestive tract was plainly apparent. My inquiry into the action of the enteric or duodenal pills has occupied a long time, because I wished, by an extended series of observations, to exclude, so far as possible, all sources of error in forming my conclusions. My studies have been further protracted by the fact that the pills which have recently been furnished are so far superior to those originally sent me as to necessitate the entire revision of my earlier work. Although I have subjected the pills to the action of various reagents in the laboratory, particularly to artificial gastric juice and to alkaline and acid solutions of varying composition, strength, and temperature, I have chiefly relied upon the clinical method in testing the merits of the pills.

The essential qualities of enteric or duodenal pills really deserving the name, being resistance to the solvent action of the gastric juice and ready solubility in the intestine, I have subjected these pills to the action of the stomach, both when it was empty and at various times during the process of gastric digestion, and have also studied the behavior of the pills in the presence of the intestinal juices. I may precede my remarks regarding the action of the stomach on the pills by calling attention to the fact that a pill if held in the mouth from one to one and a half hours, and particularly if gently moved about by the tongue, is gradually deprived of its coating and is then slowly dissolved.

In one series of my experiments the emptiness of the stomach having been first insured by thorough lavage, the pills have been ingested and saliva has subsequently been swallowed. In these cases the stomach tube has, after an hour or two hours, withdrawn the pills partly dissolved, the accompanying fluid smelling and tasting of creosote. In other cases of the same series, the washings here show no trace of the pills and no odor or taste of creosote.

In another series of experiments the pills have been taken into the empty stomach with a few swallows of pure water, and the syphon tube used after an hour or two hours. In some of these cases no trace of the pills has been found in the liquid withdrawn, and no odor or taste of the creosote has been perceived.

In other instances, notably when the subject of the experiment has been made to assume a position on the left side in order to antagonize the gastric peristole, the pills have been returned in a partly disintegrated state. The reaction of the liquid in these cases has been sometimes alkaline and sometimes neutral. In a few cases of atonic gastrectasia, the pills having been introduced into the stomach early in the morning, before breakfast, and the patients made to assume a position upon their left side, the fluid withdrawn, after an hour's interval, has contained a large percentage of bile, which had evidently gravitated through the relaxed pylorus, and the pills have been returned partially dissolved. The experiments thus far described have served to prove the ready solubility of the pills in stomachs containing alkaline media as well as to inferentially demonstrate their solubility in the menstrua actually present in the intestine.

In order to test the behavior of the pills during gastric digestion, they were, at first, given in a series of cases at varying intervals after a trial meal consisting of hot water and white bread. In these cases no trace of the pills and no odor of creosote could, as a rule, be found in the matter withdrawn from the stomach an hour or two after the trial meal; and when they *were* detected there was reason to suppose that the gastric digestion of the subjects of the experiments was defective and that the fluids of the stomach might, on that account, have remained alkaline or neutral during an unnaturally long portion of the digestive process. My failure to obtain any trace of the pills in most of these instances may be ascribed to various causes. In the first place, the orifice of the stomach-tube, through which the gastric contents were withdrawn, although the tube was the largest size in the market, may still have been so small as to prevent the easy entrance of the pill into the tube; again, the tube may not have reached the lowest point of the stomach's greater curvature, to which the pill would, usually, have gravitated if still undissolved, and some of the contents of the stomach may, therefore, have remained in the organ. In some instances the pills may have remained

adherent to the gastric mucous membrane and have thus failed to gain entrance to the tube. Finally, it is quite possible that the pills, being smooth and slippery, have stolen through the pylorus before the chyme, or with the first instalments of that fluid.

The indecisive character of the above results led me to early abandon the plan of withdrawing the trial meals and to substitute a method by which the movements of the pills could be more surely followed and their condition, at various stages of digestion, be more accurately ascertained.

This method consists in introducing pills securely attached to a suitable cord, or enclosed in thread nets, into the stomach at different periods after meals, and in withdrawing them after varying intervals, in order to ascertain whether the pills have undergone changes during the process of gastric digestion.

The length of the cords used has been about twenty-six or twenty-eight inches. The best thickness of the strings seems to be that of ordinary twine. A thread finer than twine cuts the coating of the pills, thus vitiating the results of the experiments. Early in the course of my studies into this subject, I abandoned the thread nets because the threads were, of necessity, so fine as to cut the coating of the pills quite as deeply as a single fine thread. The pills, having been carefully weighed and attached to the cord, have generally been covered with vaseline, to facilitate their deglutition and to render them still less vulnerable to the attacks of the gastric juices. After the pills have been swallowed, a little loop left in the proximal end of the string has either been caught over a tooth or deposited between the teeth and the cheek, in order to prevent this extremity of the cord from being swallowed. The subjects of these experiments, among whom I count myself, have then been allowed to go about their business, returning at a given hour in order to have the pills withdrawn, examined, and weighed. Beginning with intervals of one quarter hour the writer has gradually increased the period during which the pills have remained in the stomach up to five hours. It has not seemed necessary to extend this period because the gastric part of the digestive cycle has generally been completed and the chyme propelled into the duodenum before the expiration of five hours. The writer intends, however, to investigate the fate of pills left for a still longer time in the digestive tract, and hopes to eventually report upon the condition of such pills as, having passed the pylorus, have been withdrawn after sojourning during varying periods in the small intestine.

It affords me great gratification to now report that no change has been observed in the great majority of pills which have remained in the stomach for periods of time varying from one quarter hour to five hours.

In proof of this assertion, I have in my possession some of the pills withdrawn by myself, in a perfectly sound condition, at intervals after their introduction varying from one quarter hour to five hours. My present method of testing the pills is so simple that any one to whom these pills may be furnished can verify my statements for himself. The writer, however, desires to caution any one who is about to undertake such experiments not to introduce the pills into the stomach until sufficient time has elapsed after a meal for the alkalinity of the saliva to be neutralized by the generation of lactic or of hydrochloric acids in the organ. He would recommend that the pills be administered midway between meals in order to insure their remaining intact until the contents of the stomach pass into the bowel. In order to ascertain whether the enteric pills are dissolved in the intestine, I have caused the stools of patients taking the pills to be carefully examined, both for traces of the pills and for the odor of creosote, but with invariably negative results. The ready solubility of these pills in the intestine seems further demonstrated by the fact that the constitutional effects of creosote have been observed in all the phthisical patients whose cases I have studied during these experiments.

The conclusion reached by the writer as the result of his studies is that the enteric pills which Messrs. Parke, Davis & Co. now furnish are practically insoluble in the stomach within the normal period of gastric digestion, unless administered when the contents of that viscus present an alkaline or a neutral reaction, and that they are readily dissolved in the alkaline fluids of the small intestine.

If this conclusion is well founded, there has been added to the therapeutic armamentarium of the medical profession a weapon of incalculable value. By means of these enteric pills many substances which, given in the ordinary ways, unduly irritate the gastric mucous membrane, like creosote or salicylic acid, and those medicaments designed to exert a local action in the small intestine, such as anthelmintics, intestinal antiseptics

and astringents, may be directly conveyed into that viscus.

Parke, Davis & Co. have kindly volunteered the information that these pills were coated with an alcoholic solution of shellac containing just sufficient balsam of Peru to give the final investment a suitable degree of elasticity. I am informed that this coating, which in practice has proved so satisfactory, represents the results of a long and tedious series of experiments on the part of the analytical department in the laboratory of the house in question.

I am desirous that the attention of the profession be called to these pills as soon as possible, in order that other physicians may test them for themselves, and in order that the full credit for their discovery and preparation may be given to Messrs. Parke, Davis & Co.

37 East Thirty-third Street.

CUPRIC ARSENITE IN THE TREATMENT OF LIENTERIC DIARRHŒA.

By A. F. Hinz M.D., Idalia, Colorado.

SINCE the publication of an article in the July (1889) number of the Therapeutic Gazette, by Dr. John Aulde, of Philadelphia, on the remedial action of arsenite of copper in the treatment of cholera morbus, several confirmative notes in answer to his paper came under my observation.

I cannot find any mention of the use of arsenite of copper as a remedy previous to the one of Dr. Aulde. The drug known in commerce as Sheele's green is in the form of a green powder, composed of one part of arsenious acid and two of oxide of copper. It is soluble in ammonia and nitric acid, and yields crystals of arsenious acid by sublimation.

His first report, dating back to the September number, 1888, of the *Medical Register*, gives the result of its use in twenty cases, in patients from 1 to 60 years old, and varying, as he states, from simple colicky pains to diarrhœa and vomiting of several days' duration, and one case of acute dysentery with profuse bloody discharges from the bowels, and in every instance the treatment proved eminently successful; not a single failure occurred, and, as a rule, the pain and tenesmus subsided after the first hour, after taking the first five doses. In his last paper he confines his observation to cases of bowel affections, which occur most frequently during the summer months, with equal results.

Such remarkable results would naturally place the drug in the list of reliable remedies of our materia medica. And, as usual, his paper was quickly followed by enthusiastic reports of cases which, after all other remedies had been tried in vain, yielded promptly to the action of the arsenite of copper.

My own experience with the drug is limited to only a few cases. I have had but a few cases of cholera morbus since reading the article above mentioned, and most likely have not had a good opportunity to give it a just trial, as I always had used other remedies first, not having the drug in my case for immediate use. The reports of the patients were favorable, even those of long-standing diarrhœa. I am inclined to have confidence in its action, and shall use it exclusively in my next case. Of course, it would seem that nothing could be more prompt than a hypodermic injection of morphine, but I believe the effect on the bowel is better and recovery quicker with the administration of the arsenite of copper.

Of the curative action in lienteric diarrhœa I am convinced, since that disease does not run its course and recover naturally. I have had two typical cases, following long-standing dyspepsia, which I am positive were cured by its use. The idea of its administration in that class of alimentary disease was suggested to me from the fact that arsenic acts favorably in some cases of this kind, as well as by the experience of Dr. Aulde in the treatment of other forms of bowel affections.

The cases under consideration are those of two females, aged 50 and 57, respectively, both suffering from dyspepsia of the worst form in the last fifteen to twenty years. It is the last case I have particular reference to, since I intended to use the drug from the start, and I watched its action carefully. The patient all her lifetime has been a subject of extreme constipation in connection with dyspepsia; however, several months before I was called the diarrhœa had made its appearance. Regularly upon rising in the morning she would have five to ten passages, the first containing undigested food, the others consisting chiefly of mucus and water. The same would be repeated in the afternoon, or any other time during the day, especially after eating. All the domestic remedies available were ineffective, and she would not listen to her husband's urging her to em-

ploy medical advice, having had her confidence entirely exhausted in years of unsuccessful treatment of her dyspepsia; but matters became so alarming to her that she finally consented. She was greatly emaciated and confined to bed when I first saw her. Food of any kind would distress her, and she actually abstained from it altogether for fear of the pain and effect upon the bowels. The eructation of gases from the stomach was at times so frequent and severe that the patient from all appearances was suffocating. Vomiting seldom occurred, and, if it did, with extreme difficulty.

The object of my treatment was to stop the diarrhœa without employing astringents. With that object in view I gave digestive agents, bismuth and alteratives, and carefully-selected diet, especially milk. She could retain some food without such great distress, but the bowels did not yield in the slightest degree. The occasional use of injections and astringents would stop the frequent passages, but there was no inclination towards a cure. I commenced the use of the arsenite of copper about two weeks after beginning the other treatment. The strength of the solution used was 1 grain of the triturate, as given by Dr. Aulde, to 3 ounces of water, a teaspoonful every hour the first day, and four times a day every succeeding day. In connection I continued the following prescription to aid digestion:

℞ Acid. nitromuriat. dil., ʒiii;
Pepsin. sacch., ʒvi;
Bismuth. subnit., ʒiv;
Ext. fld. nucis vom., ʒi;
Hydrastis, ʒiii;
Glycerini, ʒvi;
Aquæ, q.s., ʒviii.
Sig.—Two teaspoonfuls with every meal.

The improvement was apparent a few days after the arsenite had been administered, not abruptly like the strong astringents, but gradually, the stools lessening about one or two a day, and digestion as well as assimilation improving gradually and slowly. The other case was similar to the one reported, only I waited longer before employing the new remedy. It is very conceivable to me that the mild astringent action of the minute doses of the copper, combined with the alterative action of arsenic, cure the constantly irritated bowel.

The hydrastis in the prescription would also act soothingly on that organ. The bismuth protects it from undigested particles, and the pepsin, with the acid in proper quantities, will do the digesting. No other treatment besides milk and other easily-digested food is necessary. Pepsin especially should be of a good quality.

For medicinal use, the arsenite of copper, according to Dr. Aulde, is prepared as follows: A triturate of one part of arsenite of copper to one hundred parts of sugar of milk is finely prepared. One grain of this dissolved in water makes a very convenient form to exhibit the drug. Tablets as prepared by manufacturing chemists are still more convenient for the ready use of that remedy.

DR. KOCH'S REMEDY.

By Karl von Ruck, B.S., M.D.,* Asheville, N. C.

THERE has already appeared in the medical and public press of this country a profusion of articles regarding the specific treatment of tuberculosis by Professor Koch's method, although little actual experience exists on this side of the Atlantic. It is not my intention to reiterate what has already been said many times over, or to report my cases treated, with so many injections of so many milligrammes each, and describe each reaction, but to add simply a few words of caution.

Although I have seen no unfavorable complications, and my cases are all apparently following a typical course, with more or less improvement, I must mention one case with tubercular infiltration of the larynx, which, after the initial injection of .3 milligramme, reacted severely in two hours, with so much swelling in the larynx that the respiration for a short time became seriously impeded. Inasmuch as 1 milligramme is recommended by Koch himself as an initial dose, and the reaction is always intensified with increasing doses, I have no doubt I should have had complete stenosis had I not given the unusually small trial dose, which has since been my rule in every case having any deposit in the larynx. This patient has since received additional injections, and has reached .004 without again showing such alarming symptoms, and is evidently improving.

Another matter requiring care is, that the reaction may occur at night-time, when the patient is asleep, and may be accompanied by stupor; and close personal and frequent ob-

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servations must be made for at least twenty-four hours if no reaction has occurred, so that it will not escape notice and lead to an increase and repetition of the dose, which then may produce dangerous symptoms.

I have one case under treatment in which each injection has been followed by profound sleep for from three to four hours, yet the other symptoms of reaction, including fever, are very slight. A third matter I had already considered seriously when making my studies in Berlin. I noted there in Koch's method what seemed to me much more of a routine procedure than I have been in the habit of witnessing in the employment of therapeutic agents by our usually discriminating and cautious German colleagues during my former years of study and subsequent visits to the German medical centres.

I found that in many instances the injections were repeated daily, and, as a rule, every other day, and that under such management the patient kept his bed constantly and lost much in his general condition, until reactions no longer followed the employment of the lymph.

Even early-stage cases lost flesh quite regularly, and the advanced cases seemed, with few exceptions, to bear the treatment very badly.

Now, I have my doubt of the correctness of any procedure, especially in consumption, under which the patient's general nutrition suffers materially in steadily losing in flesh and strength; and, before I had been in Berlin many days, I was fully resolved that I would avoid this, if possible, in my applications of this remedy. I was, therefore, agreeably surprised and much pleased to find, on a short visit to Dr. Dettweiler, the director of the institution for consumptives at Falkenstein, that he had abandoned the rapid succession of the doses, and is now allowing his patients several, and often five or six days for recuperation after a severe reaction is passed, and, as he expressed it, "with the happiest results," his patients no longer losing but regularly gaining in flesh and strength. Neither had he given up climatic treatment and other management heretofore found beneficial, but insisted upon these measures as much as ever.

My experience entirely coincides with his, and so far the local effects, as also those upon the symptoms, cough, expectoration, number of bacilli, etc., are in my cases, as in his, as favorable as I have observed in Berlin, where the treatment was repeated much more frequently.

In the mean while, I have no doubt that here, as at Falkenstein, the climatic treatment and general management is an important aid, and it is not in the interest of health resorts when I point out that, whenever possible, the specific treatment should be carried out under the most favorable climatic and other conditions, tested by years of experience to be useful in exercising undoubted curative influences. This should commend itself to the good judgment of any thoughtful observer; and under such management many even somewhat advanced cases may receive the treatment with benefit.

TREATMENT OF SYPHILIS BY MEANS OF INTRAMUSCULAR INJECTIONS OF THYMOL OF MERCURY.

DR. SCHLEICHSZADEK (*Bulletin Général de Thérapeutique et de Clinique*, December 13, 1890) has experimented with this remedy in cases of recent or inveterate syphilis. The formula which he employs consists of 1½ parts of the thymol of mercury, ½ part of mucilage of gum-arabic, and 20 parts of distilled water. The injections are usually performed every three or four days, preferably in the gluteal region.

Eighteen cases were so treated, the treatment in one lasting for forty-two days, the others for twelve days. Usually he found that after two or three injections exanthematous irruptions commenced to disappear, while after the fourth injection the ulcers were well advanced towards cure. Usually macular exanthemata of recent date only required four to six injections, while papular efflorescences only completely disappeared under six to eight injections.

Through the aid of these injections squamous and pustular affections of the most chronic cases and even specific cutaneous affections disappeared with more rapidity than could have been affected through the employment of other mercurial preparations.

He also claims to have obtained a most remarkable curative action in syphilitic laryngitis with complete aphonia, and the symptoms rapidly disappear after the first injections.

Finally, the author claims that these intramuscular injections have never been followed by any local inflammatory action nor induration or abscess, while stomatitis occurred but rarely, and was then in no case severe.

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Leading Articles.

THE USE OF STIMULANTS IN FEVERS.

THE antiphlogistic treatment of fevers in vogue in the early part of this century, under the lead of clinicians like Bouillard and Broussais, has given way to the supporting and stimulating system as taught and practised by Graves, Stokes, Todd, and Bennett in England; still later by Broadbent, Beale, Anstie, Murchison, Flint, Jurgensen, Liebermeister, Germain Sée, and hosts of other clinical leaders in all lands.

To repair the excessive losses incurred by the combustions of the febrile process, nutrients are indicated; and experience has shown that, while the digestion of solid food is imperfect or impossible, liquid aliments, as milk and broths, are absorbed with considerable readiness, and sustain the vital forces and diminish waste.

The exhibition and management of stimulants in fevers require no little tact, experience, and judgment. Doubtless mild cases may do very well on milk and broths, without a particle of alcohol from the beginning to the end of the fever. Some, as Jaccoud, give wine or other alcoholic potions indiscriminately to all their typhoid patients, the quantity varying as to age, constitution, and habits of the patient. Others wait for symptoms of general depression and heart-failure. The part of wisdom would seem to be, neither to give alcoholic stimulants altogether as a matter of routine, for some fever patients do not need them, and really do better without them, nor to wait for marked manifestations of depression before giving wine or brandy.

Stokes, in his admirable "Lectures on Fever," dwells at some length on what he calls "the anticipative treatment," by which is to be understood the administration of stimulants at an early stage of the fever, when, "although there may be no very pressing vital symptoms calling for their use, the sagacity of the physician enables him to foretell the occurrence of great prostration of vital energy." He believes that this anticipative method is that which will most conduce to the saving of life. By the early exhibition of alcohol, we follow the old maxim, "Venienti occurrite morbo." Stimulants are given to guard against a sudden sinking of the vital energy, shown by special conditions of the nervous and the circulatory systems. In determining on the employment of the anticipative treatment, the epidemic character or habit of the disease must be taken into account. If, for example, it is known that in the epidemic a great number of cases assume well-marked symptoms of prostration, say on the seventh, eighth, or ninth day, the physician will on the fourth or fifth day anticipate their occurrence by commencing the use of stimulants. The antecedents of the patient, his habits of life, his previous health, etc., will also furnish indications as to the advisability of beginning the anticipative treatment. Stokes has found that in typhus fever the anticipative treatment is more frequently called for than in typhoid.

In the aged and debilitated, when attacked with pneumonia, typhoid, or any other febrile disease of more than ephemeral duration, the expediency of early beginning a stimulating treatment is everywhere recognized. The attending physician will be very chary in the use of veratrum or antimonials, and will from the very first order some wine or brandy, in such doses as will in his judgment sustain the heart and nervous system. Unfortunately, such persons are bad subjects for pneumonia or typhoid, and will often sink about the sixth or seventh day, despite the most careful supporting treatment.

Among the "classic" signs indicative of the necessity of stimulants, we have the dry, brown tongue, sordes in the mouth, stupor or subdelirium, coldness of the surface, a peculiar fever odor, often present from the first, feebleness and irregularity of the heart's action. The quick, soft, compressible, wavy pulse calls for alcohol. Perhaps no better rules based on the condition of the heart can be formulated for the administration of stimulants than those which Stokes has laid down in the work before referred to. The following, according to him, are the physical signs which seem to indicate the early use of stimulants:

1. Early subsidence of the first sound, observed over the left ventricle.

2. Diminution of the first sound over the right ventricle.

3. The heart acting with a single, and that the second, sound.

4. Both sounds being audible, but their relative intensity being changed, so as to represent the action of the heart of a fœtus *in utero*.

5. With these signs, a progressive diminution of impulse, which occasionally becomes imperceptible, even when the patient lies on the left side.

As to the quantity of alcohol to be administered, everything will depend on the condition and previous habits and idiosyncrasies of the patient. An adult male patient, about the fifteenth day (or about the time of crisis) of typhoid fever, with nervous and circulatory symptoms, indicating a tendency to sinking, will often bear enormous quantities of alcohol, and it is not an uncommon event for patients in this condition to be dosed to the extent of a quart of wine and a quart of brandy in the twenty-four hours. The most judicious practitioners are disposed to exercise moderation in alcoholizing patients, even in states of asystolism, and believe that nothing is gained by exceeding an ounce of good whiskey or brandy per hour; if this will not save life, more will be inefficacious. It cannot be too much remembered that in giving alcohol to fever patients we are adding another poison to the blood, and that the patient may be as much endangered by excess as by lack of alcohol.

As to the preparation of alcohol to be chosen, the practitioner must be guided by the idiosyncrasies of the patient and the degree of prostration. Some persons do better on wine than on any other stimulant; this is often the case with delicate females and with children. In states of prostration, whiskey or brandy is the most likely to arouse and sustain the flagging forces. Whatever alcoholic preparation be chosen, the physician cannot be too careful as to the *purity* of the spirituous liquor administered; new liquors are to be shunned, and only samples of rum, whiskey, or brandy admitted to the sick-room that are at least five years old, and have been kept that length of time mellowing in the cask. The importance of this precept is sufficiently obvious to all who have had any experience in the selection of liquors of good quality for medicinal usage.

SABURRAL FEVER AND ITS TREATMENT.

IN these days of specific fevers and bacteriology it is well to remember that there are other fevers besides typhoid, and other causes of disease besides microbes. The young graduate fresh from the hospital and from lectures will possibly be well posted in the symptoms and treatment of everything but those forms of disease which he will be very likely first to encounter. His first case of "typhoid" (?) will perhaps prove to be simple gastro-enteritis, "catarrhal fever," or acute indigestion. Rendon has shown the exceeding probability that there are fevers due to overwork (*surmenage*) and the accumulation in the economy of waste extractive matters;* and Talamon has again called attention to the exceeding prevalence of fevers of a continuous or remittent type, due simply to morbid conditions of the stomach;† the product of vicious fermentations, or, what is perhaps more probable, poisonous ptomaïnes of microbe origin generated in the alimentary canal being absorbed into the blood in a more or less intermittent manner, acting on the thermogenetic and other nervous centres, and causing symptoms of a very pronounced though seldom dangerous character. The old writers gave to this pyrexial disease the name of "saburral fever," indicating by the epithet *saburral* that they believed it due to foulness of the stomach,—*i.e.*, an accumulation of saburræ in that organ. The French names *embarras gastrique*, *état saburral* are synonymous.

The facts do not warrant the hypothesis that saburral fever is acute catarrh of the

* "Les Fièvres de Surmenage," Paris, 1888.

† "Études Médicales," Paris, 1881, p. 584.

stomach (as some have maintained), or an abortive typhus (Liebermeister). The symptoms are subordinate to the gastro-intestinal derangement. The disease begins with loss of appetite (which may be gradual); the tongue is large, white, and dirty; the mouth clammy; the breath fetid; constipation is habitual; the patient is languid, feeble, and has no aptitude for work; the discomfort augments after each attempt to take food; then febrile paroxysms, preceded by chills and followed by sweating, set in. Sometimes hepatic symptoms, such as jaundice and enlargement of the liver, are present. All the morbid phenomena improve under the judicious use of saline purgatives frequently repeated.

These patients, as Lecorché and Talamon remark,* are generally persons who suffer more or less habitually from bad digestion. Under the influence of overwork, emotion, exposure to cold, etc., there is arrest of digestion; nausea and vomiting, headache, chills and fever supervene. The supposition of putrid fermentations in the stomach and intestines, and the absorption of the abnormal products of digestion, with poisonous ptomaïnes elaborated by microbes, will explain the symptoms better than any other hypothesis.

In children, convulsions often usher in and accompany the disease, as an expression of the general toxæmic condition.

The duration of the disease is variable; it may last with a nearly continued fever for a week, or even longer, resembling a mild typhoid. In other cases, after one or more attacks of chills followed by fever, profuse evacuation—the result of medicine, or supervening spontaneously—may set in, and convalescence may rapidly take place.

The treatment should be such as is calculated to promote thorough cleansing and antisepsis of the alimentary canal. There can be little doubt as to the propriety of an emetic of ipecac at the onset. This may be followed by a "c. cum j." purge, or by three of the *pil. cathartica co.*, a full dose of Hunyadi or Rubinat water being given the next day. In no disease is the efficacy of judicious purging more conspicuous. There is generally constipation from the first; even when there is diarrhœa, the natural evacuations may be insufficient, without the aid of daily saline cathartics, to clear the alimentary canal of offending products.

* "Études Médicales," p. 586.

There can, moreover, be no doubt as to the utility of disinfecting the digestive tube by the administration in suitable doses of such antiseptics as naphthol, naphthalin, salol, salicylate of sodium or bismuth, charcoal, etc.; the diet should be light and bland consisting principally of milk-and-water gruel.

CHLORALANTIPYRIN.

HYDRATE OF CHLORAL combines with antipyrin to form two well-defined compounds, the one containing one molecule of the hydrate of chloral and one of antipyrin, or the so-called monochloral-antipyrin; the other containing two molecules of hydrate of chloral and one molecule of antipyrin. If concentrated solutions of hydrate of chloral and antipyrin in water are mixed (the antipyrin being in excess), an oily substance is produced, which settles to the lower part of the mixture, and, when allowed to stand for some time, crystallizes. This substance, which is monochloralantipyrin, and whose existence has been recognized for some time, was the cause of the statement of certain pharmacologists that antipyrin and chloral are incompatible. Chemical analysis shows that these crystals form a true chemical compound, the composition of which is one molecule of antipyrin and one molecule of hydrate of chloral, though yet the individual characteristics of antipyrin and chloral are not lost. Thus, a red color is formed with the perchloride of iron, the characteristic sign of antipyrin, and Fehling's solution is reduced and chloroform is produced when treated with a solution of caustic potash and heated, the latter tests being characteristic of chloral.

Bichloralantipyrin is formed by taking concentrated solutions of antipyrin, and so mixing them that the result shall contain two molecules of chloral to one of antipyrin, and an oily product likewise results, which again in time forms definite crystals in the form of prismatic needles, possessing the same reactions, however, as monochloralantipyrin.

If it be admitted that these two bodies are definite compounds, a fact which at first seems not entirely probable, for it can hardly be admitted that a compound body could give the distinct tests of its separate components it would be interesting to determine as to whether the action of the two compounds

are identical. We have already on previous occasions published the conclusions of several observers as to the action of this combination of chloral and antipyrin. The most recent contribution to the literature of this subject is an elaborate experimental essay published by Professor Sée in *La Médecine Moderne* for December 18, 1890. He has shown that both the monochloralantipyrin and the bichloralantipyrin possess a similar action to chloral, differing from the latter only in being less depressing in their action on the heart and blood-vessels. In the dose of 3 to 4 grains for every two pounds of body-weight, when injected into the veins, a hypnotic action is produced, while anæsthesia and abolition of reflexes only occur when the doses reach 4 and 5 grains. He has found that sleep always follows anæsthesia, and that the toxic dose is about the same for both products, being about 15 grains for every two pounds of body-weight, death in such cases being produced by arrest of the heart and respiration, respiratory arrest always preceding that of the heart.

When one compares the toxic doses above mentioned with the quantity of chloral contained in each of these two bodies, it would seem that the chloral contained in the monochloral compound is less toxic than that in the bichloral.

Dr. Sée further maintains that never, even in toxic doses, are convulsions produced by the monochloral or the bichloral of antipyrin, and that the action of the chloral thus masks that of antipyrin.

With small doses the respiration becomes slowed and becomes superficial, but if the injections are continued respiration becomes accelerated, abdominal in character, with prolongation of the expiration, breathing finally being arrested with the chest in expiration. So also after each injection the heart is somewhat slowed and intra-arterial pressure reduced. Then follows a phase of transient irregularity in the pulsations of the heart, which, however, disappear when sleep is induced. Should, however, the remedy be given in continuedly increasing doses, systole of the heart diminishes in amplitude, and the heart is finally arrested in diastole.

Dr. Sée has likewise investigated the therapeutic effects of these remedies, and finds that, like chloral, their use is not without danger in patients affected with heart-disease; for in such cases they augment venous stasis, may produce dyspnœa, increase the quantity of albumen in the urine, and lead to various congestions. Especially in myocarditis they are particularly dangerous, since they depress the energy of the heart and destroy cardiac rhythm. Dr. Sée's results thus differ considerably from those of Dr. Bardet, who considers them as antispasmodics and hypnotics.

Dr. Sée terminates his article with the following conclusions:

1. Mono- and bichloralantipyrin, in doses of 45 grains, are hypnotic remedies, comparable to chloral.

2. They have no paralgesic action.

3. They should be prohibited in cardiac cases, above all when there is any disturbance in compensation.

4. They may, however, be administered with impunity as hypnotics in cases of aortic disease, if compensation is perfect.

5. They have no action in dyspnœa, whether of cardiac or pulmonary origin.

6. In some cases they seem to slightly augment diuresis.

7. They are almost as irritating to the digestive tube as chloral.

8. Compared to sulphonal and the other hypnotics of the chloral series (such as chloralamide and chloralimide), mono- and bichloralantipyrin are much inferior, on account of their depressing action on the blood-vessels and heart, even although that depression be less than that which follows the use of chloral.

Dr. Sée's conclusions thus are in accord with the observations of Dr. Quinquand (THERAPEUTIC GAZETTE, September 15, 1890, p. 648), and seem to show that this compound of chloral and antipyrin is not as inert as is maintained by Reuter (GAZETTE, March 15, 1890).

KOCH'S REMEDY FOR TUBERCULOSIS.

WE print on another page of this issue a statement which Koch has at last published as to the composition of his remedy, and it seems perfectly incomprehensible that it should have been at any time thought advisable to shroud his methods with the veil of secrecy. His explanation also of his method of procedure does not to our mind seem a perfectly candid one, but rather that, some sort of a statement being forced from him by the criticisms to which he has been subjected, he has told us as little as possible. All that he tells us now is that he has suc-

ceeded in extracting the active principle from the tubercle bacilli by means of a forty to fifty per cent. solution of glycerin. We fancy that even the most expert chemist or bacteriologist would find great difficulty in preparing a satisfactory "lymph" even from the most careful study of Koch's account.

Nevertheless, ever since Koch's first statement, journals in every tongue have been perfectly deluged with reports of cases of tuberculosis treated by this remedy, the majority of them claiming "satisfactory improvement." It certainly seems that the remedy has now been long enough before the profession to warrant some conclusion as to its value, but such a conclusion as yet does not seem possible. The enthusiasm which has attended its introduction is unparalleled in the history of medicine, and yet the results on calm investigation are surprisingly meagre. Moreover, it would seem that, instead of acting as a specific cure, the remedy may even do harm, and we would call attention to the article which we likewise print on another page as to the action of this remedy on internal organs of tuberculous patients. It seems, from Professor Virchow's remarks, that even Koch's immediate disciples have been unable to determine what cases would be likely to receive benefit from the injection, and that we cannot by any means depend upon the disintegration of even small tuberculous nodules after its influence. Further, without doubt, as is shown by a number of reports, the fatal issue has undeniably been accelerated through the use of this method of treatment, and some of Virchow's cases show that while the bacilli are not killed through this remedy, thus substantiating Koch's statement, they are not only not localized in a large number of cases, but that there is under the influence of this remedy an actual increase in the tendency to the formation of metastatic nodules or areas, even at considerable distance from the original tuberculous focus. There can be, however, no doubt of the extreme activity of the remedy as prepared by Koch; and, in fact, this activity, until we learn to control it, is an additional source of danger; and cases are on record where at the outset simple apical phthisis has become complicated with rapid infiltration of the lower lobes as a result of rapid and extensive sloughing, and soon proved fatal. We cannot be too earnest in calling a halt in the indiscriminate use of this remedy, which may perhaps do good, but which undeniably may do evil.

A SO-CALLED EUCALYPTUS HONEY.

IN the THERAPEUTIC GAZETTE for June 15, 1887, we made allusion to the so-called eucalyptus honey, and at that time expressed considerable scepticism as to the existence of such a substance. It seems now that our lack of faith is warranted, for in the *Pharmaceutical Journal and Transactions* of December 13, 1890, Dr. T. P. Anderson Stuart publishes a complete account of this, which he terms "the latest Australian fraud," where he presents plenty of evidence to show that this mysterious product is a mixture of leaf eucalyptus oil with ordinary honey.

Reports on Therapeutic Progress.

THERAPEUTIC PRINCIPLES GOVERNING THE SELECTION OF CARDIAC MEDICAMENTS.

We feel that no apology is necessary in publishing a full abstract of the two admirable lectures printed by DR. S. SOLIS COHEN in the *New York Medical Journal* for November 29 and December 6, 1890. These lectures are typical examples of the value of scientific investigation to practical therapeutics, and they bear upon subjects whose importance cannot be overestimated, and yet subjects concerning which there is too little exact knowledge obtainable. At the outset Dr. Cohen calls attention particularly to the fact that in all nature the period of repose is the period of repair; the period of activity is the period of waste. Rest means construction, upbuilding, a coming together of matter, with storing up of energy. Action means destruction, down-throwing, a tearing apart of matter with liberation of energy.

Throughout nature we have that continual rhythmic alternation of attraction, repulsion; construction, destruction; upbuilding, down-throwing; which, in the study of life-processes we call the *metabolic rhythm*, applying to its two phases the Greek terms, *anabolism* and *catabolism*.

Upon the preservation of this rhythm—that is to say, upon the maintenance of the normal relations between anabolism and catabolism, rest and action, repair and waste—depends the *structural and functional integrity* which constitutes the health of the various tissues of the body, and of the great aggregations of tissues we term organs or viscera.

Upon the preservation of this rhythm—that is to say, upon the maintenance of the normal relations among the activities of the various organs—depends the proper balance of function, the *intrinsic organic harmony*, which constitutes the health of the organism as a whole; in the case of man, the health of body and mind.

Upon the preservation of this rhythm—that is to say, upon the maintenance of the normal relations between the organism and its environments—finally depends the continuance of life.

Rest is valuable in therapeutics, because it conserves energy, saving to the organism as a whole, or to a particular organ or system of organs, the force that might be dissipated in action; because it lessens waste and gives opportunity for the repair of impaired tissues; because it tends to permit restoration of the disturbed rhythm of internal functions; because it places the organism in a favorable relation with its environment.

Nowhere is this more manifest than in the therapeutic relations of the heart and circulatory system. In the heart itself we have visibly and palpably illustrated the necessary alternation of repose and action.

Now, while the living heart is never at rest, absolutely speaking, yet its two opposite motions may, in relation with one another, be considered periods, respectively, of repose and action, of anabolism and catabolism. The diastole, mainly a passive state, is a period of repair in relation with the systole, which, as an active exertion of energy, is a period of breaking down of tissue. In clinical studies, as a rule, we speak of diastole and systole, simply meaning thereby the diastole and systole of the ventricles. But in studies like the present we must bear in mind that there is another diastole and another systole,—namely, those of the auricles,—and that the ventricular and auricular motions are not supplementary, but complementary. Except for the diastolic overlapping in the so-called period of pause, auricular diastole is synchronous not with the diastole, but with the systole of the ventricles, while auricular systole coincides in time with the diastole of the ventricles. When the blood is leaving the ventricles to enter the arteries, it is at the other end of the circuit entering the auricles from the veins. When it leaves the auricles it passes directly from them into the ventricles.

During diastole of the auricles, then, the heart receives into these chambers on the right side from the systemic circulation through the venæ cavæ, and on the left side from the pulmonic circulation through the pulmonary veins, the blood, which, during systole of the auricles and coincident diastole of the ventricles, passes into the latter, and by their systole is sent out from the right ventricle through the pulmonary artery into the pulmonic circulation, and from the left ventricle through the aorta into the systemic circulation. Following this is a so-called period of pause, both auricles and ventricles being relaxed. Auricular systole then follows as before. Reflux of blood from ventricles to auricles or from arteries to ventricles is prevented by valves. For proper circulation, both auricular and ventricular diastoles and systoles must preserve normal relations with each other, with the pulmonic and general blood-pressure, and with the respiratory rhythm; while for proper maintenance of health, both pulmonic and systemic circulations must preserve normal relations with each other and with organic functions generally. These relations comprise, structurally, on the side of the heart, integrity of the muscle, of its membranous cover and lining, and of the valves, and the equal capacity of the four chambers. On the side of the vessels structural integrity relates to the various components of the vessel walls (fibrous, muscular, and elastic tissues), and to the endothelial lining membranes (intrinsic integrity), as well as to the absence of any cause of obstruction by pressure or otherwise due to causes external to the vessels (extrinsic integrity). Functionally, the normal relations comprise the vigor, extent, duration, and orderly succession of the various phases of the cardiac movements, the free play of the valves, the synchronous action of right and left sides. As to the vessels, normal arterial tension is the most potent factor, while proper constitution of the blood itself is a most material circumstance. While relations remain normal, the therapeutist has no function to discharge. When from any cause normal relations become disturbed, the problem presented to the therapeutist is, first, how to avert the immediate dangers arising from such disturbance; and, secondly, how to remedy the disturbance. Both phases of the problem may coincide, and the same measure solve both; or temporary measures may have to be instituted to meet an emergency, which may afterwards be withdrawn or modified as the main difficulty comes under control. In combating the main difficulty,

our measures may be radical,—that is to say, they may aim to *remove the cause* of the trouble; or, should this be impracticable, they may aim, notwithstanding persistence of the cause, to *restore equilibrium* by artificial means.

Restoration of equilibrium—that is, of the normal balance of function which constitutes health—may be accomplished *directly or indirectly.*

Direct restoration of equilibrium implies exaltation of a depressed function or depression of an unduly exalted function to the normal level. An example of such direct restoration as accomplished by nature is given by the illustration of spontaneous healing, the compensatory hypertrophy of the heart which frequently takes place in cases of insufficiency of the mitral valve. Here the enlargement of the ventricle and the increased force of the systole compensate for the leakage of blood which takes place through the damaged valve, and the balance of function is preserved. We imitate this natural compensation when we administer digitalis to increase the vigor of the cardiac contractions.

Indirect restoration of equilibrium implies either depression of normal functions to the level of an impaired function with which they may be correlated, or, on the other hand, elevation of normal functions to the level of an unduly exalted function with which they may be correlated. An example of such indirect restoration of equilibrium, at least temporarily, by nature, is the arrest of hemorrhage by syncope, where the action of the heart is depressed to the level of the impaired resisting power of the injured vessels. This is therapeutically imitated at times by the administration of aconite or the application of ice over the præcordium in cases of hæmoptysis; or, as is sometimes done by military surgeons in cases of wound through the lungs on the battle-field, by the letting of blood from an arm.

Nowhere is the therapeutic problem more complicated by the complicated relations of various functions than in the case of morbid derangements of the circulatory system, and nowhere are the results of intelligent study of the problem leading to a proper adaptation of means to end more brilliant.

In all our considerations of the actions of drugs upon the heart and vessels we must bear in mind the terminal circulation. We must remember the interchange of gases, of oxygen, and carbonic acid, not only in the lungs, but also in the intercellular lymph-spaces,—the *internal respiration;* and the allied processes of final assimilation and initial excretion,—that is, the bringing of the materials of cellular anabolism and the taking away of the products of cellular catabolism,—of which it may stand as type. We must consider, then, not alone the state and action of the heart, but also of the vessels. We must consider the distribution of the blood, peripherally, ventrally, in the various organs; the relative quantities of blood in the venous and arterial systems; as well as the relation which the whole amount of blood bears to the propulsive power of the heart. We must consider the conditions which favor and oppose circulation not only in the heart itself, the main trunks, and the larger vessels, but also in the capillaries, in the lymph-spaces, in the venous radicles. We must consider the conditions which favor and oppose the internal respiration, and also the pulmonary respiration. We must inquire into the conditions affecting the pulmonary circulation. We must examine the condition of the great abdominal vessels,—the portal circle; and estimate the effect of our therapeutic measures upon the organs of elimination, especially the skin and the kidneys, which are so powerfully influenced by changes in blood-pressure and in the tension of the vessel-walls. Other considerations, also, come into view, which, however, can be more appropriately discussed in their special relations. But, above all, we must remember that our prime object is to *restore equilibrium, to re-establish the balance of function*, for that constitutes health. And, in order that we may be able to choose proper measures by which to re-establish equilibrium, we must inform ourselves as to all the disturbing factors. Thus it is that, while so-called "polypharmacy"—the objectless throwing together of a number of drugs in one prescription—is to be unhesitatingly condemned, yet in the application of remedies to the treatment of diseases affecting the heart and circulation it is often necessary to intelligently combine agents some of whose actions are in opposition. Digitalis, for example, may in some cases of cardiac dilatation, while acting beneficially upon the heart, yet, through its action upon the vessels in unduly heightening arterial tension, tend to again disturb the equilibrium which its cardiac action tends to restore. In such cases, as has been more especially shown by Bartholow, we can, by the simultaneous administration of nitroglycerin, which relaxes the terminal vessels, modify the digitalis effect;

and the therapeutic object—*restoration of the balance of function*—is successfully accomplished. We must now try to gain some further insight into the important relations between those two great factors in the circulation which the example just cited shows us in apparent opposition,—the systolic impulse and the arterial tension.

The force by which the blood-current overcomes resistance is called the blood-pressure. The great cause of blood-pressure is the systolic contraction. Pressure is greatest in the ventricles during their systole, and least in the auricles during their diastole. Therefore these states, as we have seen, being coincident in time, the blood moves *from* the ventricles (in systole) and *towards* the auricles (then in diastole), traversing meanwhile the systemic and pulmonic vessels. These vessels afford the only route of communication between the left ventricle and the right ventricle on the one hand (systemic circulation), and between the right ventricle and the left auricle on the other hand (pulmonic circulation). There must be a gradual and continuous fall of pressure along these routes from terminal to terminal, in order to permit the movement of the blood, which takes place in the direction of least resistance. As pressure acts equally in all directions, the blood-pressure opposes the action of the heart in systole, and favors the action of the heart in diastole; in other words, there is, in consequence of the blood-pressure in the arterial system, a constant tendency towards reflux to the heart, which is normally prevented during systole by the higher pressure in the heart, and during diastole, so far as the ventricles are concerned, by the closure of the pulmonary and aortic valves. Thus the blood-pressure at any point represents the *possibilities of circulation* at that point. It should be higher than at the point beyond, and lower than at the point preceding. Whenever these conditions are reversed there is obstruction to circulation.

In applying these physical considerations, the author takes as the simplest example at command a case of simple dilatation of the heart without valvular lesion. With the symptoms of this condition all are familiar. In the natural order of studies they come first. It was the palpitation, dyspnœa, coldness of extremities, tendency to vertigo and syncope, incapability for exertion, weak, rapid, irregular, perhaps intermittent pulse, œdema more or less marked, that, together with the physical signs obtained upon auscultation and percussion, led to the diagnosis. Embarrassment of circulation due to an incompetent heart was the clinical diagnosis. Dilatation without valvular lesion was the pathological diagnosis. Simple dilatation, it is true, is very rarely, indeed some say never, encountered at autopsies. Still it is a condition precedent to some of the lesions ordinarily found post mortem; it is clinically recognizable, and it affords the best foundation for our studies. The cause of the morbid condition in this case is in the background. It may have passed away, but it has produced its effect, and that effect is, in the strict use of words, incurable. We cannot by therapeutic measures restore the heart to its normal size. The indications, then, are to prolong life and promote comfort.

The "*what* to do" is to place this patient's permanently-damaged heart in such relations with his other organs, and the patient himself in such relations with his environments, that life may go on as long as possible and with as little distress as possible.

The "*how* to do it" is the next point to be determined. Evidently there are two complementary indications. The one is to reduce as much as possible the work placed upon the heart,—*indirect restoration of equilibrium.* The other—*direct restoration of equilibrium*—is to strengthen the heart as much as possible, and to so regulate its action as to get the best possible results from what strength it possesses; in other words, the maximum of product with the least expenditure of energy.

Then the "*where*" naturally follows; first, we apply our remedial measures to the organism as a whole; and, secondly, to the heart.

The first thing to be done is to place the patient in as favorable a condition as possible in relation with his environment. We must reduce the activities of the body at large to the level of the impaired power of the heart, and therefore the patient must not be allowed to pursue a laborious occupation, or one which may make sudden demands for extraordinary exertion, either mental or physical. He must be protected from shocks and emotional disturbances of all kinds.

According to the degree of dilatation, the patient's social status and previous habits of life, and the extent to which untoward symptoms have developed, the physician's advice as to occupation, rest, and exercise will vary. Absolute rest may be necessary for a while if there be acute or severe symptoms of em-

barrassment of circulation or respiration, or if there be much dropsy. On the other hand, a certain amount of exercise—active or passive, or both—is necessary, whenever no counterindication exists. It is necessary in order that terminal circulation and internal respiration shall be kept up, in order that the products of waste shall be removed. It must be gentle and intermittent; never allowed to become fatiguing. Walking is the best form of active exercise, and this may be supplemented by such passive exercise as the simpler and gentler forms of massage,—friction and stroking. A wealthy patient may be told to take short walks while his carriage follows him, with instructions to enter the carriage as soon as he has gone the prescribed distance, or sooner, should he feel the slightest indication or premonition of fatigue. In the city, patients who do not have carriages should walk on a street in which there is a car-track, and in the opposite direction to the cars, so that they may ride home, and be able to do this at any moment. Where this is impracticable, the walk must be so divided that going and returning shall not be too much. In all cases the distance must be prescribed and not left to whim; at first very little,—half a block, in the city,—and gradually increased to whatever maximum may be judged to be proper. This maximum must always be a little short of what is deemed to be the limit of the patient's ability. It is always well if a walk can be broken by intervals of sitting. We can for this purpose let patients ride to a park or square, if in the city, so that in the square they may alternately walk for little whiles, and rest for little whiles on the benches. Massage should be employed as an adjuvant when walking is possible, and as a substitute for active exercise when the latter is impossible. It should not be practised more than fifteen or twenty minutes at a time, except in special cases. It must be gently and skilfully done, the patient being in the recumbent posture. The lower extremities especially should be manipulated. As far as is wise in any individual case, the effort should be made to act upon the veins directly, so as to impel the blood centripetally, yet not in too great a volume for the heart to deal with. The principles set forth in our study of massage must be kept in mind. Should dropsy be present, the time and manner of manipulation would be governed accordingly. Electric applications are of service in some cases of dropsy, but the consideration of this measure must be postponed until we have studied the action of the electric current more in detail.

In some cases the patient will be able and may be permitted to engage in some light occupation which itself allows opportunities for moderate exercise, alternating with rest. In these cases no special walks will have to be advised and massage may not be needed. It is necessary to secure for all patients, however, a certain amount of time in the open air every fair day, during which they may sit, ride, or walk, according to circumstances. Where a sufficiency of outing cannot be obtained, inhalations of oxygen or of compressed air may be administered. Compressed air is also of advantage in equalizing the circulation by its mechanical pressure-effects.

The first effect of impaired cardiac power is deficient circulation. As we have lowered the general muscular and mental activities—that is, exertions in relation with external environment—to the level of this impaired circulation, so must we lower what may be called the internal exertions to the same level.

Beginning our consideration of these with the digestive system, it is obvious that we must reduce the amount of work placed upon it, while at the same time the impoverished condition of the heart-muscle calls for the best possible nutrition. And not only must we endeavor to nourish the heart itself, but we must remember that, as a further consequence of impaired circulation all the organs and tissues have suffered in two ways,—from lack of proper material for anabolism, and from defective removal of the products of catabolism. The blood is, to a greater or less degree, stagnating in the veins. It cannot get back to the lungs to be purified. So that the comparatively empty arteries bring little new material for upbuilding; the overfilled veins retain the poisonous products of the breaking down of tissue. Therefore, while diminishing the quantity of food ingested, in order thus to diminish the work of the digestive organs, we must highly increase the nutritive value of the food as well as its force-producing value, and, as far as possible, diminish the amount of waste that will be left to deal with. Such foods, then, are to be chosen as, in the study of the subject of food, are found to fulfil the indications mentioned,—milk, oils and fats, especially butter, a moderate amount of properly prepared meat, eggs, fish, rice, grapes, and certain other fruits containing sugar, malt preparations, al-

cohol (malt liquors, sweet wines, and spirits) in moderation, and the green vegetables. Potatoes and other bulky foods are to be interdicted, as are all sorts of indigestible cookery. Predigested foods, especially preparations of peptonized beef, and such combinations of peptone and maltose as the "peptonized milk-gruel," are of great service. The digestive ferments are sometimes serviceable, as is also the administration of dilute acids, during or immediately after meals. According to circumstances, food may be taken frequently in small quantities, or in the ordinary manner of three stated meals. As a rule, a glass of hot milk or milk-punch should be taken at bedtime.

Respiration, being the "second digestion," must be properly performed. We have already spoken of exercise and of inhalations of compressed air and of oxygen. Solution of hydrogen dioxide in water or in ether (ozonic ether) may be given to supplement respiration by utilizing the stomach for the direct introduction of oxygen into the blood. The so-called "fifteen-volume" aqueous solution, properly diluted, may be given in doses of from 1 to 4 fluidrachms. The ozonic ether may be given in doses of 1 fluidrachm, with an equal quantity of glycerin, in enough water to make a tablespoonful. These agents also tend to slow and strengthen the heart. The cardiac medicaments, to be considered later, likewise favorably influence the respiration.

Extraordinary attention must be paid to the excretions, not only for the reasons already and sufficiently dwelt upon, but also to prevent dropsy from accumulation of fluids in the ill-nourished veins,—a combination of circumstances under which transudation is most likely to occur. Fortunately, among the medicaments most appropriate to the cardiac conditions are several of the best diuretics and diaphoretics. In addition to these, agents acting upon the liver and the intestines must be employed, continuously or from time to time, as indicated.

Three indications are to be fulfilled by cholagogue and purgative medication. First, we avoid increased obstruction to the great portal circulation, already sufficiently embarrassed. Secondly, we can, by the use of suitable agents, remove from the circulation, by way of the intestinal vessels, a large amount of fluid, thus diminishing the volume of blood to meet the impaired propulsive power of the heart, and increasing the comparative richness of the blood in corpuscular elements. In cases of dropsy, we actively resort to this method in order to secure reabsorption of the transuded fluid to take the place of that removed by way of the bowel; but it is better to prevent dropsy by continuous mild purgation. The third indication is that of removing waste products, the importance of which by this time we fully understand. Sodium phosphate, euonymin, and similar resins, rhubarb, Epsom salts, Rochelle salts, various mineral waters, calomel, and jalap are among the most useful agents, the choice depending upon principles already laid down in discussing cholagogue and purgative medication. Calomel and Rochelle salts have the additional usefulness of a certain amount of diuretic power. It is especially in cases of cardiac impairment that the diuretic properties of calomel are most available.

Remedies to improve the condition of the blood itself are also to be administered. Of these, iron stands first; next to it is arsenic. Chloride of gold and sodium, bichloride of mercury, and chloride of calcium may sometimes be useful for short periods in alternation with iron or arsenic. Cod-liver oil stands prominently forth as a hydrocarbonaceous food and a blood-former of great utility. Phosphorus and its preparations, more especially the hypophosphites, may in some cases be advantageously combined with the cod-liver oil. Given alone, they are of little use in the class of cases under consideration.

And now, having placed our patient in harmony with his enviroment; having lowered his digestive work to the capacity of his circulation, and improved both the digestive product and the blood itself in accordance with the needs of the impoverished tissues; having done what we could to improve respiration so far as it can be improved independently of circulation; and having duly attended to the excretions,—we can devote our attention to the organ which is itself at fault.

The first lesson to be drawn from the considerations thus far passed in review is this: That the diseased organ is not the only organ to be treated, and not always the first; and that direct treatment is not always the first or the best. It is very probable that the measures already adopted will so far have improved the heart by their indirect influence as to considerably modify the indications for direct cardiac remedies.

While this is the preferable method of procedure, yet there is another side to the question. It may be that, on account of the

patient's necessities or the demands of his business, our advice as to rest and regulated exercise cannot be carried out. Remember, this is the best advice. It is our duty to place before the patient the danger of neglecting it. Still it may be impossible to follow it. Then we must modify it to the exigencies of the occasion, and the choice of a remedy to act directly upon the heart will come up at once.

In the case supposed of simple dilatation without valvular lesion, the indication is "to empty the veins and fill the arteries;" and the best agent at our command is digitalis. The best preparation of this drug to use in the case supposed is the powder of the leaves, which may be made into pill and given in the dose of ¼ to 1 grain or more, three times a day. The tincture may be employed in doses of from 2 to 5 drops or more, three times a day. Where a diuretic effect is specially desired the infusion is sometimes to be preferred, in doses of ½ fluidounce, night and morning.

By prolonging the diastole, digitalis increases the period of comparative rest; of anabolism. It gives opportunity for increased nourishment of the muscular tissue. It gives opportunity for an increased accumulation of energy to be later discharged in the systole. And by increasing the force of the systole it compensates for a certain part of the lost original vigor of the heart. By slowing the circulation, it diminishes the relative expenditure of energy in a given time. By its action upon the kidney, it increases the excretion of urine,—both the watery and the solid constituents.

It may, however, have one untoward effect. It heightens blood-pressure by causing contraction of the arterioles, and thus to a certain extent opposes the cardiac contraction. Should this action be too pronounced, we can overcome it by the simultaneous administration of nitroglycerin, or other nitrite. The nitrites, by dilating the vessels, and especially the peripheral vessels, invite the blood into the capillary circulation, and take off from the heart a great portion of its labor. As a matter of course, they must be cautiously employed, the smallest dose ($\frac{1}{100}$ minim or less of nitroglycerin, three times a day) being given at first, and the quantity gradually increased until the desired effect is produced. In some cases nitroglycerin or nitrite of sodium may be given alone. The labor of the heart being thus diminished and its tone having been improved by nutritive measures, the administration of digitalis will not be necessary. This expedient is particularly useful in the treatment of fatty heart, in which digitalis, as we have previously seen, is, as a rule, counter-indicated. In these cases arsenic and strychnine are extremely useful agents.

But to return to digitalis, we must remember that no sudden change of posture is to be permitted during its administration. Especially dangerous is the change from recumbency to the erect posture. We must also avoid the risk of producing a cumulative effect, and the best, as it is the most obvious, method to avoid this danger is the routine intermission of the use of the drug at intervals to be determined by all the circumstances of the individual case.

But what are we to substitute for digitalis during these periods of intermission, or in those cases in which it is not well borne, though apparently indicated? Of single agents, strophanthus is to be preferred. Convallaria and adonis vernalis, or their active principles, and sparteine, a principle derived from scoparius, are also useful, and by some authors preferred. Better sometimes than any single agent is the combination of caffeine or cocaine with strychnine. Before discussing the other agents, then, let us briefly recall our knowledge of the action of caffeine and that of strychnine, and see why it is that this combination is of such great utility. Strychnine, in the first place, is a general tonic, improving digestion and increasing the capacity of the individual for physical and mental exertion. In addition to this, it has distinct usefulness as an agent acting upon circulation and respiration. It affects the centres of organic life, heightening their impressionability and increasing the energy of their discharge. It thus acts by central influence as a stimulant to the heart and to the respiratory muscles. But it also acts peripherally upon the motor ganglia of the heart, directly stimulating and heightening the energy of their discharge. It also acts upon the muscular tissue itself, increasing the vigor of contraction, a fact of which we have abundant clinical evidence as to man, whatever may be the laboratory evidence as to animals. It is thus a catabolic agent; but the catabolism which it produces is an effective catabolism, giving the highest force-product with the least degree of waste. It has some tendency to heighten peripheral blood-pressure by contracting the vessels, but this is not always marked.

Caffeine, or perhaps we ought to say the article of commerce sold under the name of caffeine, but which, as Mays has shown, is in reality a mixture of caffeine and theine,—so-called caffeine, then, acts to some extent upon the nervous supply of the heart, but its chief action is upon the heart-muscle. It increases very greatly the vigor of the systolic contractions and diminishes their frequency. It improves respiration both by directly strengthening the respiratory muscles, and indirectly by its action upon the circulation. It is a diuretic of no mean power. Like digitalis, caffeine raises the arterial tension, but in the case of caffeine this effect is not so likely to be excessive as it is in the case of digitalis; so that the conjoint use of the nitrites is not often necessary. A moderate elevation of arterial tension, if well distributed, is beneficial, as it secures a better distribution of the blood. In order to get the full benefit from caffeine, it must be used in fairly large doses,—5 grains three times a day, for example. With this, from $\frac{1}{60}$ to $\frac{1}{30}$ grain of a strychnine salt may be combined. Where in an individual case, for any reason, a more rapid effect is desired than caffeine usually gives, we may have recourse to cocaine, which may be given *per os* in doses of from $\frac{1}{8}$ to $\frac{1}{2}$ grain, or hypodermically in doses not exceeding $\frac{1}{4}$ grain. For prolonged administration, however, caffeine is to be preferred. Where neither caffeine nor its combination with strychnine seems to be sufficiently stimulating,—that is to say, where, despite the increased vigor of the cardiac contraction, it seems not to be sufficiently free,—a minute dose of cocaine—say $\frac{1}{15}$ grain—may be advantageously combined with the other agents for continuous use for short periods, say a week or two at a time. In some cases, instead of adding cocaine to the pill, a good wine of coca may be given as a beverage in appropriate doses. The patient should also be advised, even while taking digitalis, to drink a cup of strong coffee at each meal and before going to bed. In a few cases of moderate impairment of cardiac vigor, the drinking of strong coffee has sufficed to keep the patient comfortable, without resort to digitalis or other drugs.

Now, a few words as to *strophanthus*, which, as already said, the author esteems more highly than any other agent yet brought forward to replace or supersede digitalis. This drug is not yet officinal, and it is difficult to get a reliable preparation. The tincture prepared according to the directions of Fraser, of Edinburgh, is the best. It may be given in doses of from 1 minim to 10, or in some cases, with due caution, even 20 minims, three times a day; or a large dose may be given at first and the impression maintained by small doses at shorter intervals. The duration of its effect gives to it much of its great usefulness. Its effects are similar to those of digitalis, in that it slows the rate of the heart, lengthens the interval between the contractions, and increases the vigor of the muscular action. This is thought to be due to direct action on the muscle substance, and not to any effect upon the nervous system. By its action on the heart it raises blood-pressure, producing diuresis. It does not, however, markedly contract the arterioles as does digitalis, and therefore compensatory use of the nitrites is not necessary. It does not disturb the digestive tract. A patient, for example, in whom cardiac weakness is part of a general muscular and nervous degeneration, takes tincture of strophanthus and tincture of digitalis alternately and coincidently in the following manner: Having taken thrice daily for a week 10 drops of the tincture of digitalis, he begins to diminish the quantity, substituting in each dose the first day a drop of the tincture of strophanthus for a drop of the tincture of digitalis. The second day two drops, the third day three drops are substituted; and thus during ten days the digitalis is diminished and the strophanthus increased *pari passu*, until finally the patient is taking ten drops of tincture of strophanthus and no digitalis. After a week of strophanthus he begins to substitute for it the digitalis, a drop at a time, reversing the previous process. This expedient has been found preferable to either the uninterrupted continuance of either drug or an abrupt change from one to the other.

Strophantin, a glucoside derived from strophanthus, is given in doses of from $\frac{1}{120}$ to $\frac{1}{60}$ grain hypodermically, repeated at long intervals, perhaps of many days, as the effect is said to be quite prolonged.

Convallaria and its glucoside, *convallamarin*, have received high encomiums from Sée and other authorities; but neither clinical experience nor laboratory studies warrant a decided expression of opinion in its favor. In some cases it is highly useful as a substitute for digitalis, but it frequently disappoints us. Its properties as a diuretic are more constant than its power over the heart.

Adonis vernalis and its glucoside, *adonidin*, have been found useful by so eminent a clini-

cian and careful observer as Da Costa. Dr. Cohen's experience with this drug is very limited, but is satisfactory as far as it has gone. It is similar in its action to digitalis both in its effects upon the heart and vessels and its diuretic properties, but is much more powerful, and its use is said not to be attended with risk of cumulative action. At present it is employed chiefly as an adjuvant to digitalis or a temporary substitute therefor, though it is said to succeed sometimes when digitalis fails. According to some authorities it is even more likely than is digitalis to produce symptoms of gastro-intestinal irritation (nausea, vomiting, and purgation). There is no officinal preparation of adonis. An infusion is made (one-half to two drachms of the root to six fluidounces of water), of which the dose is ½ fluidounce every two to four hours. Adonidin is given in doses of from 1/16 to ½ grain, repeated as necessary.

Sparteine, derived from broom, may be given (as *sparteine sulphate*) in doses of from 1/16 to 3 or 4 grains, the ordinary range being from ½ to 2 grains. It has received high encomiums both from experimenters and clinicians, and is recommended in the warmest terms by so practical an observer as Bartholow. In some cases its most marked properties were a comparatively rapid action and a regulating power,—that is, a power to render steady and continuous the previously unsteady and intermittent heart-beats,—even superior to that of digitalis. In these cases the drug was given in small doses, repeated four or five times during the twenty-four hours. They were not, however, cases of simple dilatation such as we are now discussing, so that perhaps the conclusion is justifiable that the peculiar virtues of this drug are better applicable to the relief of those disordered conditions of innervation and muscular action which are manifest in the more advanced stages of valvular lesions. When effective, the action of the drug continues for twelve or twenty-four hours, and, according to some authorities, even longer. Sparteine has considerable diuretic power, though, as a diuretic simply, it is, in Dr. Cohen's experience, inferior to the infusion of broom. There is, however, this drawback to the use of bulky infusions in the treatment of cardiac disease,—that the quantity of fluid ingested is likely to be disadvantageous.

Erythrophleum is a drug which may eventually be found useful in the treatment of weak hearts; at present its use is almost exclusively confined to the laboratories.

Barium chloride has a limited degree of applicability, and Dr. Cohen has had a few satisfactory results from its employment, more especially in the treatment of the over-acting heart and relaxed vessels of exophthalmic goitre.

We are now perhaps in a better position to illustrate by a further refinement the extended application of our therapeutic triangle, *what*, *how*, and *where*. As we used it in solving the main problem of the line of treatment, so we can, indeed must, however unconsciously, use it in solving special problems as to details of treatment. In the selection of a drug to act upon the heart, we can choose one which affects principally the nerves, or one which affects principally the muscles, or one which acts upon both. Or, again, in its action upon the nerves, a drug may slow the heart by depressing the motor apparatus,—cerebral, peripheral, or communicating; or it may slow the heart by stimulating the inhibition apparatus,—central, peripheral, or communicating. That which makes digitalis preferable in most cases to all the other drugs mentioned is the fact that it acts both on nerves and on muscle, both on inhibitory and motor apparatus, and that the result of this combined action is to slow and strengthen the heart, by a stimulating effect throughout, without depression of any kind. For the same reason the combination of caffeine and strychnine is useful. It is true that in studying digitalis we classed it among the cardiac sedatives as well as among cardiac tonics. But its sedative power is the sedative power of strength; the irritation which it calms is either the irritation of weakness or the irritation of loss of control.

When sedation is required for a heart which is acting too rapidly or too powerfully, because it is too strong, digitalis is not an appropriate sedative.

In our study of aconite we recognized in it a depressant *ab initio*. Digitalis, if pushed too far, may paralyze by exhaustion. But aconite is a paralyzing agent from the first. It depresses nervous function without much interference with muscular power *per se*. While it is true that experiments on normal animals have not revealed any such property, its prolonged administration, in perfectly safe medicinal doses, seems, clinically, to cause a certain degree of retrograde metamorphosis in hypertrophied heart-muscles, probably by influence on trophic nerves, or, in other words, by interference with anabolism. Its peculiar field of usefulness is in cases where

we wish to reduce power, and hypertrophy without valvular lesion may serve as a type of these cases.

In a case of eccentric hypertrophy due, we will say, to excessive muscular exertion, the *what*, *how*, and *where* are self-evident.

We cannot materially alter the condition of the heart-muscle. We must avert evil consequences by regulation of the patient's life and by the use of agents to diminish the force of the heart's action. Now, regulation of the patient's life does not imply that we are to increase his exercise up to the level of his heart's overaction. If we could by so doing increase the size of all his organs, including the skeleton, proportionately,—in other words, if, having a gigantic heart to deal with, we could, by prescribing giant's work, transform the patient into a Goliath,—that would be the proper line of treatment; but this is manifestly impossible. Even the heart itself is not the subject of regular and proportionate enlargement; the left ventricle, in the case we are considering, being disproportionately increased both in capacity and in the thickness of its walls. We must, therefore, paradoxical as it seems, prescribe rest. It is not necessary in the ordinary case—that of the blacksmith, or that of athletes, a class of men who frequently suffer from a similar condition—to prescribe absolute rest in bed, except in the presence of urgent symptoms. We must, however, at once interdict the over-exertion which has brought about the morbid condition. Furthermore, while permitting sensible exercise, we must not allow it to be too prolonged; and all sudden or violent exertion must be absolutely prohibited. Alcohol, tobacco, immoderate eating, and mental excitement must be avoided. To prevent straining at stool, the diet must contain laxative elements, and an occasional mild purge be exhibited. All conditions which tend to disturb the circulation, particularly in the abdomen and in the lungs, must be guarded against.

The quantity of fluid taken into the stomach should be limited. In the presence of symptoms of cerebral hyperæmia a hydragogue cathartic may be used to unload the vessels. A blister may be applied to the nape of the neck and wet cupping of the chest, or even venesection, may be performed in urgent cases. As a rule, however, rest and the administration of aconite will avoid necessity for bleeding. The dose of the tincture of aconite-root will vary from 1 to 5 drops, which may be given three times a day or at intervals of two or three hours according to circumstances. Sometimes it is well to begin with larger doses, and as the influence of the drug becomes manifest to diminish the dose to as little as will keep up the effect. Very often 1 drop twice a day will be efficient. In some cases, however, comparatively large doses will need to be continued, or at all events to be resorted to, from time to time, for five or six days together. Diluted hydrocyanic acid in doses of from 2 to 5 drops, diluted hydrobromic acid in doses of from 10 to 30 minims, potassium bromide in doses of from 10 to 30 grains, potassium iodide or sodium iodide in doses of from 5 to 10 grains, may be used as adjuvants to the aconite, or in its place. Belladonna has been recommended, but it seems counterindicated, its action being both to increase the rapidity and the vigor of the heart's action and to raise the arterial tension, except when the opposite effect results from paralysis by exhaustion due to large doses.

There is, however, one condition of overaction of the heart in which belladonna is of considerable service,—namely, in the irritable, irregular, and feebly overacting heart of some cases of tobacco-poisoning. In this condition the combination of belladonna (which is in these cases preferable, by reason of its antispasmodic properties, to its alkaloid, atropine) with strychnine, digitalis, or caffeine has proved useful.

The difference between this condition and the condition of excessive strength we have been considering is at once rendered evident by the fact that digitalis has been enumerated as among the agents usefully combined with the atropine. Diluted hydrocyanic acid, cimicifuga, musk, the bromides, and especially monobromated camphor, often act beneficially in this disorder. Sodium iodide in small doses is also useful.

Having firmly fixed in our minds, then, the principles which should guide us, and the measures which may be most usefully applied in the treatment of dilatation with weakness, and hypertrophy with excessive power, apart from valvular lesion, and having briefly alluded to the pseudo-hypertrophy of irritation by tobacco, we have now to consider how our treatment is to be modified when either of these conditions coexists with a valvular lesion. We can do this more briefly on account of the wide range which our previous studies have taken. It will be self-evident that where hypertrophy coexists with a valvular lesion, being itself not al

the physical result of that valvular lesion, but also nature's "spontaneous healing," in the sense in which we have agreed to use this term, it will be self-evident that where such hypertrophy is in degree merely enough to compensate for the damaged condition of the valve there is no occasion for therapeutic interference. Conversely, when a valvular lesion has been thus compensated by hypertrophy, the condition of the valve affords no indication for therapeutic interference. Should the hypertrophy be excessive,—that is, more than sufficient for compensation,—just in the degree that excess exists will such excess afford indication for treatment with aconite or a bromine salt, or both. In the majority of cases, however, even when the lesion—for example, mitral regurgitation—is compensated by ventricular hypertrophy, it is necessary to adopt, to some extent, the hygienic measures which we discussed at length in the case of simple dilatation, for the hypertrophy which balances mitral regurgitation is to be looked upon as potentially a condition of dilatation. It becomes actual dilatation when it no longer suffices to overcome the obstruction to circulation brought about by the regurgitation. This is called *rupture of compensation*, and the treatment then is almost exactly that of dilatation, both hygienically and medicinally. In other words, in cases of mitral regurgitation, the main indication for treatment is afforded not by the condition of the valve, but by the condition of the muscle relatively to the valve. Clinically, the rational symptoms—that is to say, the condition of the circulation and respiration, the presence or absence of dropsies—are the data upon which we base our opinion as to whether or not compensation exists.

Somewhat different indications are afforded by aortic stenosis, for here not alone the condition of the muscle, but that of the valve itself must be considered when the selection of medicaments become necessary,—that is to say, when compensation has been ruptured. For example, we can not resort to digitalis to strengthen the muscle, as we would in a case of mitral regurgitation with ruptured compensation, on the principle that the condition is practically a condition of excessive dilatation. Digitalis raises peripheral blood-pressure, and would thus co-operate with the obstruction at the aortic orifice in opposing exit of blood from the ventricle. By lengthening the diastole, it would permit a quantity of blood to enter the ventricle beyond the capacity of the ventricle to empty itself, thus increasing the embarrassment. If regurgitation coexists with the stenosis, as is usually the case, the lengthening of the diastole would also permit a greater reflux from the aorta into the ventricle. The net result, then, of the action of digitalis in aortic stenosis would be to overfill the ventricle, and any increase of power of contraction which it would give might tend to drive the blood backward through the mitral orifice rather than forward through the obstructed aortic orifice; for it would be quite possible for the gradual increase in the size of the heart, which has been brought about by the lesion, to have rendered even an intact mitral valve relatively incompetent and not able to withstand any great strain. Blood, like everything else, moves in the direction of least resistance.

If now we apply our therapeutic triangle, we see that *what* we want to do is to get the blood out of the ventricle as quickly as possible, and to have the ventricle again moderately refilled as quickly as possible. *How* to do this is to increase the rapidity of the contractions and to diminish the intervals between them. A moderate degree of increased vigor is, of course, necessary in order to overcome the obstruction; and, further, systemic blood-pressure should be lowered as far as is consistent with movement of the blood into the veins. These conditions are fulfilled by using a combination of atropine and strychnine, in conjunction with nitroglycerin or nitrite of amyl. The atropine, in addition to its power to hasten the rate and increase the vigor of the cardiac contractions, is, like strychnine, a stimulant to respiration also, while the nitroglycerin keeps the arterial tension within the required limits.

In cases of mitral stenosis,—that is to say, when the flow of blood from the left auricle into the left ventricle is impeded,—the indications are (1) to prolong the ventricular diastole so that as much blood as possible may get through the narrowed orifice; (2) to strengthen the heart-muscle so that the auricular contraction may be as effective as possible; and (3) when this lesion coexists, as it often does, with mitral regurgitation, to lower peripheral blood-pressure. The hygienic measures already discussed—iron and arsenic as nutritives, strychnine and caffeine as cardiac tonics—fulfil the two indications of uncomplicated stenosis, while digitalis and the nitrites are useful in cases complicated with regurgitation.

Aortic regurgitation remains to be considered, for uncomplicated tricuspid lesions and

lesions of the pulmonary valve are very rare.

There has been much difference of opinion as to whether or not digitalis should be used in cases of aortic regurgitation. As has been more especially pointed out by Bartholow, the rational symptoms rather than the pathological condition must be our guide. It will be easily seen that undue prolongation of the diastole will permit greater regurgitation, and that when compensation can be brought about without digitalis this drug had better be omitted. Nevertheless, the increased force which results from the digitalis action may be sufficient to more than balance the increased regurgitation which it permits, and in many cases it proves useful. It is, as will be readily evident upon reflection, most efficient in those cases of aortic regurgitation which coexist with mitral disease. Dr. Cohen's advice, then, would be, in any case of aortic regurgitation, to postpone the use of digitalis until other measures have proved inefficient. The most useful combination of medicaments is that of atropine, strychnine, and caffeine, with the occasional use of the nitrites. In all cases, of course, those measures of hygiene which bring the patient into harmony with his environment, and which aid in restoring the internal balance of function independently of the medicaments, are to be as carefully prescribed, as in the case in which we considered such measures at length.

There are other measures than those mentioned which might have been considered had time permitted. The effects of heat and cold, the use of opium as a sedative and as a heart-tonic in small doses, might have been enlarged upon. Camphor, and especially the monobromated camphor, musk, ergot, cimicifuga, veratrum viride, and other drugs which have a certain usefulness in special conditions, deserve more than mere mention. But we have had to choose the best and the most generally applicable measures; and then, too, we have alluded to the virtues of these agents in our previous studies.

In conclusion, then, the first problem which presents itself in the treatment of chronic diseases of the heart is to determine whether or not nature herself has brought about restoration of equilibrium. Where this is the case, the function of the therapeutist is so to guide the life of his patient as to postpone to the furthest time possible the rupture of compensation. When compensation has been ruptured, or in cases where it has never been established, the first duty of the physician—unless urgent symptoms, such as ascites or thoracic effusions, call for immediate measures to meet the emergency—is to institute those hygienic measures which shall restore extrinsic and intrinsic harmony. After this, if medicaments are necessary, their selection should be based upon a careful study of all the conditions of the individual case, taking due account of the mental and physical characteristics of the patient.

HYPNOTIC ACTION OF ATROPINE AND DUBOISINE.

Dr. Nikolaus Ostermayer, of Buda Pesth, draws the following conclusions from a number of experiments made on the action of atropine and duboisine. (*Internationale Klinische Rundschau*, November 9, 1890.)

1. Atropine in doses of $\frac{1}{64}$ to $\frac{1}{32}$ of a grain is an undoubted sedative in maniacal cases, and is indirectly a hypnotic in so far as the reduced reflex irritability which follows its administration tends to favor sleep.

2. It is not to be compared with the safe and prompt action of hyocine in this respect, although the amount of depression which follows its use in medium doses is much less likewise than that which is caused by hyocine.

3. From repeated employment the organism becomes habituated to its use and the effects become accordingly less, or even may be entirely absent.

4. Unfavorable complications, with the exception of vomiting and diarrhœa in one case, are never observed.

5. Atropine frequently has in the author's hands succeeded in producing a sedative effect where hyocine and morphine had proved entirely inert.

From the above it would appear that atropine in certain cases may perhaps possess some sedative properties, yet there is so much to be said on the opposite side of the question that it is doubtful whether its use will ever become general. As regards duboisine, the author concludes that, in excitable conditions and various mental affections, duboisine is comparable to hyocine, and is free from any of the objections which may be urged against the use of the latter.

1. The sedative action of duboisine may be observed within ten or fifteen minutes after the injection.

2. Duboisine's prominent action is a sedative one, and sleep ordinarily follows within twenty to thirty minutes after its administration.

3. In states of extreme excitement $\frac{1}{8\frac{1}{2}}$ grain to $\frac{1}{24}$ grain are required in simple insomnia, and $\frac{1}{64}$ or $\frac{1}{40}$ grain will usually suffice.

4. Symptoms of poisoning or unfavorable after-effects were never noticed.

5. The action of this remedy becomes weaker under prolonged use. The remedy was used by the author in 1 per mille solution.

The author likewise claims that the system becomes habituated to the use of hyocine as is the case with atropine and duboisine. In fact, he seems to regard duboisine as quite as useful a remedy as hyocine, as regards its activity, and preferable to it on account of its greater cheapness.

THE ACTION OF SOMNAL.

From five experiments made in the Loomis Laboratory, New York, by DR. W. GILMAN THOMPSON (*New York Medical Journal*, November 29, 1890), it appears that:

1. The ordinary dose of somnal (30 minims for man) may be given by hypodermic injection to dogs without other effect than drowsiness and slight vertigo and muscular tremor.

2. A dose of 1½ fluidrachms failed to affect a cat, except in the same manner as the dogs.

3. A fatal dose of ½ fluidounce stopped the respiration before the heart, and caused congestion of all the abdominal viscera.

4. The blood-pressure in the arteries of a dog is temporarily increased by somnal, soon returning to the normal.

Dr. Thompson further states that in the past few months he has given somnal on fifty-four different occasions, in doses varying from 30 minims to a drachm, in forty different patients, care being taken to select only those patients who presented well-marked cases of insomnia. The cases were selected also with a view of having as great a variety as possible in the causes of the insomnia. The list includes, therefore, insomnia due to rheumatism, phthisis, bronchitis (cough), typhoid delirium, delirium tremens, sciatica, various forms of pelvic pain, neuralgias, etc.

Of the fifty-four instances in which somnal was given, it produced sleep twenty-six times within fifteen minutes and forty-three times within an hour. In six cases only it is noted as having no effect at all. In a few other instances where it failed to induce sleep it was found to have a very soothing and quieting effect. Sixteen patients slept practically all night after taking ½ drachm. Fifteen more slept between three and six hours, and the remainder for briefer intervals.

In most of the patients the character of the sleep was natural; in only one or two cases did it seem more profound than usual. There were no after-effects noted in any case, with one exception,—that of a patient with tuberculosis, who slept seven hours and a half, after ½-drachm dose, and felt depressed on awakening. Most of the patients felt considerably refreshed, many of them decidedly so. There was no disturbance of the stomach or of digestion, with one exception, where a patient with endometritis complained of pain after taking a dose of ½ drachm. Doses of 45 minims, and even 60 minims, produced no depression on the circulation or respiration,—a very different effect from that of large doses of chloral. A patient with delirium tremens became drowsy in a few minutes after taking a drachm, but soon had to be quieted by other remedies. A case of typhoid fever with active delirium, almost maniacal, was unaffected by 40 minims, but was immediately quieted by hydrobromate of hyoscine. Pain or cough, if severe, was not much relieved, though a soothing effect was sometimes observed.

Conclusions.—1. The effects of somnal are much more striking and certain than those of urethan, and far less depressing than those of chloral.

2. There is no vertigo or depression after taking somnal, such as may follow the use of sulphonal.

3. The action of somnal is usually very prompt, and doses of ½ drachm, disguised in a little syrup of tolu or whiskey, are always well borne, easily taken, and entirely without deleterious effect.

4. The drug, in doses of a drachm, is not powerful enough to decidedly control delirium tremens, maniacal delirium, or severe pain.

5. In doses of 30 or 40 minims somnal is a safe and reliable hypnotic for ordinary insomnia.

TREATMENT OF CHOREA BY EXALGIN.

In the *Bulletin Général de Thérapeutique*, November 30, 1890, DR. MONCORVO writes that shortly after the first employment of antipyrin in the treatment of chorea by Wolner in Germany in 1887, and in France in 1888 by Legroux, that he had tested this remedy in cases of chorea, and had met with seven instances in which cure was readily

produced by this agent. He had noted in the case of his youngest patients a remarkable tolerance towards antipyrin, ninety grains being given in a day without producing the least disagreeable symptom. Although, the author writes, he was highly satisfied with his success in the employment of this remedy in chorea, he was led recently to test the action of a new amidogen, a derivative of the aromatic series methylacetanilide or exalgin. At first his employment of this remedy was simply as an analgesic, and he found that he might give to his youngest patient a daily dose of 4½ grains without any inconvenience resulting. His success with this employment of exalgin was so marked that he was led to test its value in various other nervous cases. One was that of a boy, 9 years of age, of a highly nervous disposition, who for a long time had been affected with polyuria, complicated with nocturnal incontinence. In this case antipyrin had been given in the dose of 45 grains daily, and had somewhat reduced the quantity of urine, but there had been no effect on the nocturnal incontinence. The author then administered exalgin in the dose of 3 grains with a still more marked reduction in the polyuria and more improvement in the nocturnal incontinence of urine. The next case was that of a child, 8 years of age, of a highly nervous, inherited disposition. He presented a marked case of chorea, which was entirely cured within eighteen days of treatment with exalgin. Although these single cases, of course, cannot be regarded as conclusive evidence, they indicate perhaps a useful addition to our list of remedies.

AN IMPROVEMENT IN INTERNAL PHLEBOTOMY.

In a recent issue of the GAZETTE we published an account of a method of bleeding in some forms of pulmonary congestion recommended by Dr. Christian Simpson. This article has led to the appearance of a publication by DR. GEORGE HARLEY in the *Lancet* for November 29, 1890, in which he confirms the effectiveness and value of this method of phlebotomy, recommending, however, a slight modification in the mode of procedure which will make the plugging of a wound by the coagulum still more secure and effective. It is evident that when the stream of blood from the lung has been interrupted by stopping the mouth of the canula with the finger, the coagulum formed within it will be in a continuous mass with the one formed at the distal orifice of the instrument. So that on the withdrawal of the canula there will exist considerable danger of the small blood-clot that has formed between the extreme end of the canula and the lesion made in the tissue by the point of the trocar becoming detached from its surroundings and withdrawn along with the coagulum inside the canula, to which it will of necessity not alone be continuous, but likewise intimately adherent. In order to reduce this risk to a minimum, as well as the equal danger of any oozing of blood taking place from the walls of the passage after the removal of the canula, which bleeding would of itself to a certain extent tend to defeat the object held in view in encouraging the formation of the blood-clot, Dr. Harley proposes a simple modification in Dr. Simpson's mode of procedure, which will be equally applicable to cases of pulmonary and hepatic phlebotomy.

What is wanted is, of course, not only to encourage the formation of an intrapulmonary or an intrahepatic blood-clot, but at the same time to insure its fixation in the wound, in order to avoid all risk, after the withdrawal of the canula, of hemorrhage either into the pleural cavity on the one hand, or into the abdomen on the other. Dr. Harley's proposal is this: As the trocar has always to be thrust some distance into the tissues of the organ from which it is desired to extract blood, he thinks before placing the point of the finger on the mouth of the canula, with the view of arresting the blood-flow, it should be slightly withdrawn,—say, about half an inch or more,—in order to leave an empty passage wherein a sufficiently large blood-clot may form and fill the channel. In which case the surrounding tissues of the organ will, in contracting upon the clot, hold it so firmly by their own resilience that, on the withdrawal of the canula, it will break off from the end of the much larger mass within it, and remain as an effective plug in the wound. This is a point of greater importance in cases of pulmonary than of hepatic phlebotomy. For while the rigidity of the ribs makes it impossible for one to compress by means of a pad and binder the thoracic walls against the wound-orifice in the lung sufficiently firmly to preclude the escape of blood from it, in the case of the liver, on account of the wound being made in the outer surface and the abdominal parietes immediately over it being freely mobile, no difficulty whatever is experienced in bring-

ing the abdominal walls into firm contact with the orifice of the wound in the liver by the application of a bandage and compress, and thus effectually preventing after-hemorrhage. However, even in the case of hepatic phlebotomy, it is just as well to recommend taking the additional precaution of preventing, by the induction of the formation of an intrahepatic blood-clot, any possibility of internal bleeding occurring.

CARDIAC REMEDIES.

In a paper by Drs. Rummo and Ferranini, analyzed by Professor Sée in *La Médecine Moderne*, December 11, 1890, the authors show that when cardiac insufficiency is recognized the following questions should be asked:

1. If the insufficiency is due to an irreparable destruction of the myocardium.
2. If it is due to degeneration of its fibres.
3. Whether it is simply the result of a temporary enfeeblement and independent of all degeneration.

From these points of view Drs. Rummo and Ferranini have endeavored, through experimental studies, to determine which of the cardiac remedies have a special action on the vessels, which on the muscular apparatus, and which on the nervous system of the heart. If, for example, in a case of aortic stenosis one should prescribe a remedy which increases pressure by contraction of the peripheral blood-vessels, the result would still further conflict with the action of the heart; for to a circumscribed contraction which interferes with the free exit of blood from the left ventricle is added a general stenosis resulting from the contraction of the blood-vessels produced by the remedy.

The authors have shown by their studies that certain remedies, especially caffeine and sparteine, particularly influence the enervation of the heart. Other remedies, such as helleborin and very particularly strophantin, produce a stimulating action on the myocardium, while they are without influence on the nervous system of the heart: nerium oleander, digitalin, erythrophleine act principally on the myocardium, while they are without influence on the nervous system, while cocaine and convallamarin act principally on the myocardium; therefore the authors conclude that in cardiac cases, where there is loss of power in the heart, that caffeine and sparteine should be prescribed. When there is feebleness of the heart, occurring in patients suffering from insufficiency and from aortic stenosis, or whenever the resistance is situated in the systemic circulation, recourse should be had to strophantin, while in mitral stenosis, or where there is obstruction in the pulmonary circulation, recourse should be had to digitalis, adonidin, and convallamarin.

With these views Dr. Sée is in perfect accord, though he regards as an important omission the fact that iodide of potassium is not included in this group, since he believes that there can be no possible therapeutics of heart-affections which do not consider the diuretic action of this remedy and of lactose, and of the influence of the iodide of potassium on the organs of circulation.

THE VALUE OF HYDRONAPHTHOL AS AN ANTISEPTIC.

Hydronaphthol is said to be non-poisonous, non-corrosive, and non-irritant, while being at the same time a powerful antiseptic, and although it has been before the profession for some time, its exact status in medicine has been much more accurately established through some experiments published by Dr. Thomas H. Bryce, in the *British Medical Journal* for November 22, 1890.

This substance is one of the naphthol series, being a derivative of beta-naphthol, and occurs as a whitish powder of fine, flaky crystals, freely soluble in alcohol but extremely insoluble in cold water. In cold water it is not wholly soluble in two thousand parts, though it is much more soluble in hot water. There seems to be little doubt that many of the clinical failures which have attended the use of this remedy are attributable to its insolubility in water. Even in alcohol hydronaphthol is at once thrown out when the solution is stronger than one-twentieth, but if glycerin is added this precipitation is largely prevented, and Dr. Bryce has, accordingly, in his experiments, employed a solution made of one part of hydronaphthol dissolved in ten parts of rectified spirits, to which glycerin is added in sufficient amount to make a one per cent. solution.

Dr. Bryce's experiments were designed to test, first, the germicidal, and, second, the inhibitory power of hydronaphthol, employing a single organism in all the experiments, namely, *staphylococcus pyogenes aureus*, on account of its ready recognition by its distinctive color. The author's first series of experiments were conducted as follows:

Solutions of the antiseptic were made up in sterilized flasks with water which had been boiled for fifteen minutes on three successive days. This sterile solution was then inoculated with the organism, and after the required time had passed, two or three drops of the inoculated solution were transferred by a sterilized pipette or a sterilized platinum wire twisted into a little coil, to a quantity of melted gelatin in a large tube, which was then solidified in a thin film on the interior of the tube by rolling under a tap of cold running water. The tubes were set aside for a week, and the results noted.

The fallacy of contamination was avoided, first, by keeping the gelatin to be used for some time to prove that it was sterile; secondly, by carefully sterilizing all vessels and implements; and, thirdly, by using sterilized water for making up the solutions.

Results were controlled in every experiment by a number of (control) solutions treated in the same way, and made up with sterilized water containing rectified spirit and glycerin in quantities corresponding to the hydronaphthol solutions.

Negative results were thus confirmed, and the possibility of the spirit and glycerin in the solutions alone being antiseptic guarded against; again, the possible inhibition of the growth of the organism in the gelatin by the drops of hydronaphthol solution transferred to it was discounted by remelting a tube, which showed a negative result, reinoculating with the organism from a pure culture, and rolling as before. If the organism grew, the negative result was thus confirmed. Further, as the reaction between antiseptic and organism must be modified not only by the strength of the solution of the antiseptic, but by the dose of the organism and the length of time during which it is exposed to its action, the experiments were arranged to meet these three factors.

In addition he found that a solution of 1 to 500 was sufficient in fifteen minutes, 1 to 500 in one hour, 1 to 800 in twenty-four hours. In sterilizing these cultivations, and without going into the details of his experiments, his results seem to show that in hydronaphthol we have a powerful antiseptic agent which, however, cannot be employed in simple aqueous solutions, owing to its insolubility in water within the limits of its germicidal power. Yet some such method, as the author recommends, of preparing a solution of 1 to 400 yields reliable antiseptic effects.

THE TREATMENT OF MYXŒDEMA BY THYROID GRAFTS.

It is generally admitted that the condition described under the name of myxœdema is attributable either to degeneration occurring in the thyroid gland or to its removal in surgical operations, and experiments made on animals seem to have proved that myxœdema may be artificially produced by ablation of the thyroid gland, and that transplantation of a thyroid gland is capable of arresting the pathological process after its inauguration in this manner. Various authors have attempted to treat myxœdema in man by hypodermic grafts of the thyroid glands of the sheep, and the results have been sufficiently satisfactory to warrant a continuation of such experiments.

At the meeting of the Société Médicale des Hôpitaux, held November 14, 1890 (*La Tribune Médicale*, November 20, 1890), DR. MERKLEN presented a patient in whom symptoms of myxœdema had developed at the age of 30 years. The patient was one of low grade of intelligence, but was not idiotic; she had for ten years previous to the development of the myxœdema suffered from persistent metrorrhagia, whose symptoms persisted for months without interruption. After having tried various tonic and hæmostatic treatments in vain, the author decided to practise the thyroid graft. Accordingly there was inserted in the right submammary region one of the lobes of a thyroid gland taken from a living sheep, only a few minutes elapsing between the extirpation of the gland and the introduction in the wound previously made in the breast of the patient. The operation was performed under the most perfect antiseptic precautions, and the wound healed by first intention. Three days afterwards the metrorrhagia was entirely arrested, and now, at an interval of seventy-two days, has not returned.

The experiments of Horsley, Albertoni, and Tizzoni all demonstrate that ablation of the thyroid gland in animals is followed by anæmia and augmentation of the number of leucocytes, while the blood presents a considerable diminution in the amount of oxygen contained in it; this demonstrates the fact that the thyroid gland plays a considerable *rôle* in hæmatopoiesis, and that the hemorrhage and anæmia observed in myxœdema are due to the atrophy or the absence of the thyroid gland.

While there is no doubt that in the author's

case marked relief was obtained, it is, of course, questionable whether this improvement would be permanent or not. The definite results must depend upon the ultimate fate of the transplanted gland. If it is not reabsorbed a definite cure can be hoped for. On the contrary, should the graft be reabsorbed, the state of affairs which existed before the operation will be apt to recur.

WET ANTISEPTIC DRESSINGS IN INJURIES OF THE HAND.

At the meeting of the Southern Surgical and Gynæcological Association, held in Atlanta, November 11, 12, and 13, 1890, DR. WILLIAM PERRIN NICOLSON, of Atlanta, Ga., read a paper on this subject (*Medical Record*, December 13, 1890).

After dwelling upon the importance of the subject, both from the stand-point of the future earning capacity of the patient and the large amount of financial compensation demanded from corporations, he stated that for seven or eight years past he had looked after the surgery of several railroads and manufacturing establishments, and in that time had been called upon to treat more than three hundred hand-injuries, representing all grades of injury, from slight contusion to complete destruction of the larger part of the hand. The especial point that was urged in the paper was the doctrine formulated by Verneuil,—never to use a scalpel in a hand-injury. The old teaching, that when a finger was crushed you should go far enough behind the injury to secure a sound flap and amputate, was pernicious in the extreme, and had cost thousands of fingers that would have been restored to usefulness. Only such parts as were actually destroyed and pulpified should be removed, and all the tissues to come away could be amputated with the scissors. Projecting pieces of bone could be removed with pliers until reduced to the level of the fleshy parts. In compound fractures the parts should be coaptated as well as possible, and the line of separation be determined by nature, and under strict antiseptic dressings. Such a slough was harmless. Another point to which attention was forcibly called was the utilization of blood-clot in filling up ragged injuries, and by its substitution the restoration of lost parts. When a finger was crushed off, the end should be trimmed with scissors, and the clot utilized in building up a tissue over the bone. In reference to dressings, Dr. Nicolson said that he had tried almost all varieties, and had finally obtained the most satisfactory results from keeping the parts constantly bathed in a non-poisonous antiseptic solution.

In dealing with these wounds they were first cleansed as well as possible, and then bathed in a sublimate solution. Over all wounds a piece of aseptic rubber tissue or oiled silk was placed, then iodoform and sublimate gauze, and finally over all a covering of rubber tissue, into which, at some convenient point, a small opening was made. The patient was then given a bottle of antiseptic solution to be carried in his pocket if moving about, and instructed to pour, at frequent intervals, enough into this opening to saturate the dressings. He uses almost exclusively listerine, combined with a small amount of carbolic acid, in the proportion of half an ounce of the former and half a drachm of the latter, in a six-ounce mixture. If there was much pain a small amount of aqueous extract of opium was added. These dressings were not disturbed until the third day, when they were removed under strict antisepsis, to preserve the integrity of the blood-clot. Wet dressings were substituted at the end of about a week by the ordinary antiseptic dressings kept moist by external covering of rubber tissue. Should sloughing occur, it is kept wet for a longer time with the antiseptic. Under this treatment pain was reduced to the minimum. Suppuration never occurred, and the separation of sloughs was facilitated by the warm moisture.

THE COURSE AND TREATMENT OF PURULENT PLEURITIC EFFUSIONS.

In a long contribution to the *Revue de Médecine* for November, 1890, PROFESSOR M. KIENER, of Montpellier, discusses the question of the natural course and treatment of pleuritic effusions, and especially those of the fibrino-purulent and wholly purulent forms respectively. His own experience, which has been extensive, proves that much greater success has attended the treatment of such cases in recent years than was formerly the case. He discusses the routine treatment of pleurotomy with antiseptic cleansing of the pleural cavity, and suggests that a constant practice of this kind is not necessary. The fibrino-purulent effusions are produced by the pneumococcus, the streptococcus pyogenes, or the tubercle

bacillus. The wholly purulent effusions are set up by the staphylococcus aureus or albus, either alone or associated with other forms of micro-organisms, and especially with the tubercle bacillus. He shows that the fibrogenous process of inflammation may be independent of the action of any micro-organisms, but that the subsequent changes which the effused fibrinous material is to undergo are largely influenced by their presence. Dead organized products may undergo softening, probably by the action of some ferment contained within them, and may become completely absorbed. Cultures made with fluids undergoing this process may cause liquefaction of gelatin without the smallest trace of any bacterial growth. The occurrence of fibrino-purulent effusions, following septic forms of pneumonia and inflammation of other organs, has been shown to have been closely associated with influenza and the presence of the pneumococcus, and illustrative cases are quoted by Professor Kiener in which pleurotomy and antiseptic cleansing have effected a cure. Examples of successful treatment of pleurisy following simple pneumonia are also given. He points out that where purulent effusion follows upon infectious disease it tends to localize itself, and the organisms which flourish within it do not penetrate deeply into surrounding structures, but, if allowed to remain undisturbed, the conditions become those of a local abscess, and the general system is gradually poisoned by the ptomaïnes engendered by the micro-organisms. In the case of multiple abscesses it is sometimes advisable to allow the pus to break its way into the bronchi. Pleurotomy is not always necessary, as simple puncture is sufficient in some cases, but if pus reaccumulates, the chest should be opened. The operation should not be done until the fluid in the pleura is entirely converted into pus. As a general rule, fifty or sixty days should be allowed to elapse between the onset of the pleurisy and the opening of the pleura. Adding fifteen days for the initial pneumonia and two months for the recovery, the whole case would last about four months and a half. Intrapleural injections of antiseptic fluids should be avoided if possible, and free drainage provided, care being taken to prevent the entry of fresh organisms. Neutral solutions may occasionally be required to wash away accidental accumulations, such as blood clots. Boracic-acid solutions should be used with caution. The wholly purulent effusions associated with the presence of staphylococcus aureus and albus are by no means so regular in their clinical course as the effusions following pneumonia. In none of the cases observed during the recent epidemic of influenza could the staphylococcus aureus be found in the fluids of any of the great serous cavities, unless there had been some direct communication between those cavities and the external air. In all cases the diplococcus pneumoniæ and the streptococcus pyogenes were discovered, whether any such communication existed or not. The pathogenic action of staphylococcus differs essentially from that of pneumococcus and streptococcus. The former gives rise at once to the formation of pus, while the other two are fibrogenous, and call forth at first a solid effusion of fibrinous material which liquefies subsequently. Staphylococcus behaves towards animal tissues as a peptonizing ferment, and not as a cause of coagulation. Its virulence is variable, but it is capable of retaining it for long periods. It grows luxuriantly in artificial cultivation, whereas the other forms do not. It is thus easy to understand why effusions set up by staphylococcus run such an irregular course, and are amenable only to antiseptic treatment.—*British Medical Journal*, December 6, 1890.

THE INDICATIONS FOR OPERATION IN ECTOPIC GESTATION.

At the meeting of the Southern Surgical and Gynæcological Association, held in Atlanta, November 11, 12, and 13, DR. C. A. L. REED, of Cincinnati, O., read a paper on this subject (*Medical Record*, December 13, 1890).

The paper starts out with the assumption that the only proper treatment of ectopic gestation is by laparotomy, or, more properly, colotomy. While the profession has become practically unanimous that this is the proper line of treatment, the indications for operation have been less definitely decided upon. This conviction is forced upon the observer not only by a study of the literature of the subject, but by encountering cases which have been advised against operation by their attending physicians until hemorrhage within the pelvis has threatened a fatality, which is but too frequently realized. The most legitimate excuse for this dilatory practice is to be found in the confusion which has arisen with regard to the supposed uniform casual relationship of ruptured ectopic gestation to pelvic hæmatocele, and the division of the latter in

"primary" and "secondary" rupture. These terms are unfortunate, and, as used in this connection, may be entirely arbitrary. Primary rupture is made to mean rupture beneath the peritoneum, instead of first rupture, as the etymology of the word would imply, while secondary rupture is made to mean rupture within the peritoneum, instead of second rupture; whereas an intraperitoneal rupture may be, and frequently is, a primary rupture, when spoken of with reference to the sequence of events in ectopic gestation. There would be no serious confusion even here, if we were not also taught to leave extraperitoneal hæmatoceles alone, to be taken care of by absorption, and if we did not add that, as these hæmatoceles are generally caused by ruptured ectopic gestation sacs, we are to relegate these cases also to the expectant plan of treatment. This conclusion is without warrant, and is responsible for hundreds of deaths annually from this one cause.

The treatment of ectopic gestation premises the diagnosis of this condition. This is obviously difficult, and in the majority of instances cannot be arrived at at all, or, if at all, only presumptively; but in all these cases conditions can be found in the pelvis, which, if not conclusive of extrauterine pregnancy, yet constitute conclusive indications for exploratory operation. The presumption of ectopic pregnancy can be arrived at before rupture chiefly by a history of previous sterility, by a previous amenorrhœa, followed after a few weeks by irregular hemorrhage, by increased tumefaction to either side or back of the uterus, and by the existence of false decidua within the uterus. The latter fact may be safely determined by the judicious use of the Emmet curette forceps. The diagnosis after rupture is essentially the diagnosis of internal hemorrhage. Time wasted either to determine the cause of that hemorrhage, or to find out if it be primary or secondary, is criminal. The thing to do is to cut down and operate. The position has been taken that time should be taken for the patient to rally from the shock. One of Dr. Reed's own cases died simply because he waited twelve hours for reaction,—a lesson which taught him the fallacy of the old teaching, and which has since saved life at his hands. The best way to overcome shock from internal hemorrhage is to stimulate the patient by giving ether, stop the drain by ligating the bleeding vessels, and rouse the nervous system by washing out the belly with hot water.

Dr. Reed's conclusions are: 1. The only proper treatment of ectopic gestation is that by abdominal section. 2. The operation should be done in cases before rupture as soon as the condition can be presumptively diagnosticated. 3. The operation should be done in cases after rupture as soon as the evidences of internal hemorrhage become apparent. 4. In cases in which the period of viability has already been reached without rupture, pregnancy should be allowed to advance to term before operation, but only under the closest possible vigilance. 5. In all cases the appendages from both sides should be removed, providing the condition of the patient will permit of the extension of the operation.

THE RÔLE OF THE LYMPHATIC CELLS IN PROTECTION OF THE ORGANISM AGAINST INFECTION OF BACILLI.

Among the various theories advanced to explain the phenomena of cure or of vaccination in infectious diseases there is one which is especially seductive on account of its extreme simplicity. According to this tneory the white corpuscles, or the lymphatic cells, have for their function the protection of the organism against the infection of microbes. It is well known that these white corpuscles have the power of movement, of developing prolongations by means of which they seize foreign bodies and incorporate them in their own mass. They act in a similar manner towards microbes, and microbes once devoured by such cells are subjected to a true intercellular digestion, and are thus destroyed, and the name of phagocytes (from the two Greek words, *φαγω*, meaning "I devour," and *κυτος*, "cells") is accordingly given to such protoplasmic organisms. In order to verify this theory, DR. PHISALIX has recently undertaken in Professor Chauveau's laboratory a series of experiments with the microbe of anthrax on guinea-pigs, rabbits, and mice, and he reports his results before the French Académie des Sciences (*La Tribune Médicale*, November 20, 1890).

In order to safely arrive at accurate conclusions, the author's experiments were principally directed towards determining the effect of the anthrax bacilli in the lymphatic ganglia near to the point of inoculation, and he has arrived at the following results: He found that whether the animal died or lived the microbes were not destroyed in the lymphatic cells, for cultures made of such tissue in bouillon resulted in marked proliferation of the germs. In the blood, on

the other hand, they had completely lost their infective powers, for all blood cultures remained sterile. It would seem, then, from these experiments that if the lymphatic cells play a mere mechanical *rôle* in this connection their chemical action is less absolute. In all cases this action does not suffice in itself to destroy microbes, and it appears that the protection of the organism results from the influence exerted by the blood and its products of exudation on the vitality of the bacilli.

THE BROMIDE OF ETHYL NARCOSIS.

In the *Annals of Surgery* for November, 1890, Dr. F. H. Pritchard publishes an analysis of the experiments made by DR. HADERUP, in the Copenhagen clinic, with the bromide of ethyl as an anæsthetic. His conclusions being the basis of a lecture delivered before the Copenhagen Medical Society and printed in the *Bibliotek for Laeger*, B. 7, Bd. 7.

The speaker had used, in the course of about a year, this ânæsthetic in one hundred cases and found it excellent in operations of short duration. It is easily used, free from danger, and without any disagreeable after-action; but one must be sure and have a good preparation. It is quite inexpensive. The speaker only has induced *primary narcosis*, —*i.e.*, he has only given it until anæsthesia was produced, and then removed it. In all patients with heart- and lung-diseases it is contraindicated; one patient with acute bronchitis was experimented with to see its action on the pulmonary mucous membrane, which, however, in this case was negative. All the operations were extraction of teeth; in most of the cases two, three, and once eleven teeth were extracted. In no case did the patient feel anything. The dose for adults has, as a rule, been 11 to 12 grammes, which is inspired at one time. Esmarch's mask was used, with a double cover, however, and indeed it must be so tight as to allow but little atmospheric air to get in. The speaker described in detail fifty cases of narcotization,—six men, thirty-six women, and eight children. This anæsthetic acts especially well in children. It induces nausea and vomiting, but less so than chloroform; it seems as though the time of the last meal had but little influence. In not a few cases excitation was noticed, but it was as a rule only slight. Nothing is said by the speaker on its influence upon the pulse. The pupils dilate according to the profoundness of the narcosis; in one case only were they contracted. Narcosis appeared, on an average, in children after thirty-two, in adults after forty-six seconds; it lasted, in the former, one, in the latter, one and a half minutes, but the analgesia may last somewhat longer. The general condition rights itself in a few minutes after; but not rarely the patients have nausea and vomiting after awakening. A little vertigo is very frequent, lasting, however, only a few minutes. This drug may, of course, be used in other minor surgical operations. Anæsthesia may be prolonged to ten and fifteen minutes, or the patient may be allowed to awaken and then be narcotized at once again. If anæsthesia be prolonged beyond ten and fifteen minutes, narcosis does not apparently continue, the patient becomes restless and the painful sensations seem to return. Bromide of ethyl has the advantage over chloroform of being less dangerous; over ether of being less inflammable as in operations where illumination or thermo-cautery is used. In the discussion which followed Dr. Haderup's lecture, Dr. Engelsen states that in very nervous patients he has gotten poor results as only an alleviation of pain, but no freedom from pain was produced. The patients also have a very badly-smelling breath for several days after narcotization. The muscles become only very slightly relaxed. Dr. William Meyer has used bromide of ethyl narcosis in a small number of operations on the pharynx and ear, in children as well as adults; in adults it was given while sitting, in children while lying. He used 5 to 20 grammes (80–320 gtt.) of the drug and as a rule induced only primary narcosis, which made its appearance after one-half and five minutes. None of the operations lasted over four minutes, and during that time there was always analgesia; in aural operations the narcosis was often continued during the operation. He has seen excitation more frequently and it has been longer lasting than in Haderup's cases; but movements, cries, etc., should not hinder one to begin or continue the operation, as nevertheless there is analgesia. When the arm falls down without resistance, analgesia was always complete. Disagreeable consequences were seen very rarely; once apnœa was remarked. The cyanosis of the face is quite distinct. He has seen more disagreeable after-effects than Haderup. The patients awaken quickly; but in about one-third of the adults there followed partly a sense of weight in the extremities, partly vertigo, and sometimes nausea. As a rule these effects soon pass away, but

not always; for in one patient there was headache lasting one day; in a second patient it lasted two days, and several were unable to go home alone. In children the after-action is less. In a child with very large adenoid vegetations a very violent hemorrhage took place from the nose, but this ceased the moment the child was raised up. In many cases everything goes on smoothly, and the remedy, in general, is excessively pleasant to administer and is to be recommended in private practice, as one may get on without an assistant. Dr. Haderup observed that also in every nervous woman he was always able to produce narcosis; he has heard no complaint of badly-smelling breath. He also mentions the want of muscular relaxation, seen, for example, if one will introduce a wedge between the teeth. He has also seen one case of apnœa. He has never had the patients complain of a sensation of cold, nor seen any sign of irritation of the mucous membrane of the air passages.

THE ACTION OF STRONTIUM AND ITS SALTS.

Some time ago we published the results obtained by DR. LABORDE in a number of experiments made as to the effects of strontium and its salts on the animal organism and in *La Tribune Médicale* for December, 1890, he publishes a second series of experiments as to the comparative action of the salts of strontium and potassium compared with those of barium. The author has already shown that as compared with barium and potassium the salts of strontium are relatively innocuous, while the most interesting fact determined in the author's earlier experiments was the marked diuretic action which followed the administration of salts of strontium, especially the lactate and tartrate. From a number of experiments in this second series with the sulphate of strontium and the neutral sulphate of potassium in the first place, the neutral tartrate of strontium and the neutral tartrate of potassium, and, thirdly, the orthophosphate of strontium and the orthophosphate of potassium, the following conclusions are drawn:

Strontium seems to be absolutely innocuous, and given even in considerable doses to dogs is not only not incompatible with the good health of the animals, but even seems to be a stimulant to the appetite and nutritive function.

On the other hand, the similar compounds of potassium are markedly toxic even in small doses. The author has further been able to confirm his statement that both the tartrate and the lactate of strontium possess marked diuretic powers. Chemical examination as to the mode of elimination of strontium and its salts seems to show that it is removed both through the urine and fæces, while considerable quantities remain deposited in the liver and bones.

"URATOSIS," OR THE DEPOSITION OF CRYSTALLINE URATES IN THE TISSUES.

At the meeting of the Medical Society of London, held November 17, 1890, SIR WILLIAM ROBERTS communicated a paper upon the Deposition of the Crystalline Urates in the Tissues, considered as a separate pathological incident, with a suggestion for a distinctive name (*Lancet*, November 28, 1890).

He stated that the occurrence of such deposits was usually regarded as pathognomonic of the gouty state, but the converse of this proposition was not accepted, and clinical observers had always recognized the existence of a pathological state—to which the names of suppressed, latent, or larval gout had been applied—in which no uratic deposits could be discovered. On the other hand, the collateral conditions associated with uratic deposits differed so much from each other that they certainly would never have been classed together as various forms of one and the same disease had there not been this single connecting link of uratic deposits. Again, although the arthritic troubles of gout might be reasonably attributed to the mechanical irritation of the uratic deposit, there were other visceral and nervous troubles, assumed to be truly gouty, which could not, with our present knowledge, be thus explained. Further, uric acid existed in the body of the gouty in two very different states,—namely, in a state of solution in the blood, and precipitated in the solid form in the tissues. To the former of these conditions the term "lithæmia" had been applied, and it was invoked to explain the occurrence of the visceral and neurotic disturbances just mentioned. It would probably be well, in the interest of clear conceptions respecting gout, and as likely to contribute to the promotion of definite lines of further investigation, if we were also to isolate in our minds the latter of these two conditions—the precipitation of the crystalline urates—as a detached and independent pathological occurrence, separate from all antecedent and collateral incidents, and erect it

into a precisely definable symptom or physical sign, apart from everything else. In doing this, we should only be repeating what had been already done in regard to glycosuria in diabetes, to albuminuria in Bright's disease, and in the separation of thrombosis from phlebitis. Following these precedents, he ventured to suggest that uratic precipitation should be separated from its associated connections, and that it should be known by the name of "uratosis." Such a name would express clearly and precisely the meaning intended to be conveyed, it would bring into clearer relief the distinction between uric acid dissolved in the blood and uric acid precipitated as crystalline urate. The exact state of uric acid in lithæmia was not precisely known; it certainly did not exist in the free state, but whether it were quadrurate, or biurate, or a mixture of the two, or sometimes one and sometimes the other, was not known. On the other hand, in uratosis we knew exactly what we had to deal with, for uratic deposits were always composed of crystalline sodium biurate, and nothing else. Lithæmia was only the exaggeration of a normal condition, but uratosis, even in the minutest degree, was pathological. Further investigation might reveal the fact that the visceral neuroses were not the result of any diffuse lithæmia, but were the consequences of actual uratosis, though microscopic in amount. Experiment had convinced him that in some rare cases of gout the blood might become so laden with uric acid as to be within striking distance of a general uratosis throughout its entire mass. The establishment of the possibility of such a condition would enable us to explain the occurrence of some very obscure incidents in the history of gout. The adoption of the new name would also enable us to discuss more freely and with greater precision of language the true relation of uratic deposits to the ætiological factors which were concerned in their production; thus, in lieu of speaking of ordinary gout and of saturnine gout, it would be more accurate to speak of gouty uratosis and saturnine uratosis, for it was difficult to believe that lead poisoning produced the same constitutional diathesis as that which existed in true gout. It was much easier to imagine that the gouty diathesis and lead poisoning, while differing in all other respects, had this one tendency to uratosis in common. So with the analogy that could be drawn between uratic deposits and urinary concretions. A large group of cases of uric-acid gravel and calculus were the undoubted offspring of gout, but there was another group of cases, occurring chiefly among the poor and among the rice-eating populations, which had no kinship with gout, and were the result of a totally different set of etiological factors. Nevertheless, the clinical and pathological phenomena of the two, depending on the mechanical irritation of the concretions, were practically indistinguishable. Though some of the facts known with regard to the hereditary transmission of gout appeared to be against this hypothesis, yet the objection was answered by the fact that gout was not in reality a homogeneous nosological unity, but only a loose bundle of morbid tendencies, and these several tendencies might be transmitted in unequal degrees. It must be remembered that senescence, nervous shocks, local injury, and trophic changes were other factors which had considerable etiological force in the production of uratic deposits, and two or more of these might act in combination in determining the occurrence of uratosis. By the adoption of this name we should gain something in regard to a clearer apprehension of therapeutic indications; we could aim at minimizing the incidence of the predisposing cause, or we could aim directly at the uratosis itself. And should it turn out at last, after further inquiry and investigation, that there did subsist an absolute and invariable solidarity between uratic deposits and the gouty diathesis, we should lose nothing by adopting these proposals, but, on the contrary, should gain in facility of description and in clearness of conception in regard to the main incidents of the gouty state.

The PRESIDENT would like to have heard an opinion expressed as to the permanence of these deposits; he himself was convinced that they were removable by alkaline waters, etc. He wondered what effect the supervention of a lithæmia would have upon an already existing uratosis.

SIR ALFRED GARROD said that it would be admitted that whatever might be the origin of gout, whether neurotic or not, all the symptoms were connected with lithæmia; and in regard to uratosis, it occurred in all cases of articular gout, grave or slight. In one instance he had demonstrated an abundant deposit in the joint of a man who had had but one attack, and that thirteen years before. He was not sure that in other non-articular cases there was a similar deposition of uric acid. All the cases were connected, not necessarily with a deposition, but with

a change in the urate of soda. In the eczematous fluid of gouty subjects there was no uric acid; the inflammation appeared to destroy it. He gave his adhesion to the adoption of the name which the author had proposed.

THE PROGNOSTIC VALUE OF THE NUMBER OF RESPIRATIONS IN PULMONARY AFFECTIONS.

GERHARDT has noted exactly the number of respirations in one hundred and forty cases of pneumonia, and reports his results in the *Revue de Thérapeutique*, December 1, 1890.

He found that the number of respirations was markedly less in those cases which recover than in those which died, but that the number of respirations was of less importance in forming prognosis than the daily variation in the respiratory.

From this point of view Gerhardt divides his observations into four different categories:

1. In the first group the number of respiratory movements never becomes very high, 40 perhaps representing the average. Laennec had already observed that the number of respirations might remain nearly normal even with marked alteration of temperature, pleuritic pain, and marked diminution of the respiratory field. In all these cases the temperature was never very elevated and the pleura was not affected; but, nevertheless, when it is considered that out of sixty-nine cases, which comprised that group, there were nine deaths, it is seen that the cases were of a severe type of pneumonia.

2. In the second group, which comprises fifteen cases, the number of respirations remained elevated throughout almost the entire duration of the disease. This series comprised nine cases and six deaths, and it was in this group that the respiratory movements were most elevated, amounting to 60, and on the first day to 90 respirations a minute. The fever also was very high, although cases of pneumonia with great respiratory increase did not necessarily imply a corresponding increase in the pulse.

The third and fourth groups comprise all the cases which during the course of pneumonia indicate a temporary increase in the respiration above 40 in a minute. These cases were fifty-six in number, and Gerhardt has divided them into two classes, according as the transient acceleration of respiration was observed at the end of the disease.

3. The third group, which comprises twenty-two cases, with acceleration at the commencement of the disease, includes three fatal cases. It thus seems that acceleration of respiration at the onset of the disease does not appear to seriously affect the prognosis, especially when it is recognized that the respiratory movement of 80 to 90 a minute is not incompatible with recovery. Nevertheless the phenomena noted appeared to retard defervescence, which ordinarily occurred on the eighth or ninth day.

4. In the fourth series the acceleration, which came on towards the end of the disease, persisted up to death, which occurred in ten cases out of twenty-two.

In twelve cases the acceleration commenced before the crisis, during it, or after it. When occurring after the crisis, it might persist for a few hours up to two or three days. In regard to these last two groups, it may be said that the influence of the fever is without effect on the respiratory rate, and that the summit of the respiratory curve is entirely independent of the elevation of the temperature. It is, however, quite different as regards the extension of the lesion. The extent in the inflammation then determines an augmentation in the respiration-frequency for many days before death, while the pulse at the same time becomes more frequent.

The respiratory frequency may also when fatal depend upon other circumstances, especially those which depend upon circulatory activity, such as occurs when pulmonary œdema takes place or the power of the heart becomes weakened. It is also possible that certain mechanical or chemical conditions may occur which might influence the number of respirations, but these cannot be accurately described. Every case of pneumonia implies an irritation of the pulmonary branches of the vagus nerves, to which should be added swelling of the bronchial ganglia, and the participation of the connective tissue of the diaphragm in the neighborhood of the phrenic nerve.

TREATMENT OF HYSTERICAL FITS.

According to the Paris correspondent of the *Lancet* for November 15, 1890, the weighty authority of CHARCOT denies that hysteria, in all its protean forms, is more common in France than elsewhere; and certainly any one who has had the privilege of following the *clinique* of this master of neuropathology at

the Salpêtrière, and listening to the persuasive eloquence with which he maintains this thesis, cannot fail to have even a rooted conviction to the contrary at least severely shaken. Indeed, according to M. Charcot, there are few forms of mental or bodily derangement which hysteria is not capable of simulating to a nicety, and that not only in the female, but also quite as often in the male. That the French as a race are more emotional than either the English or the Germans is a matter of common remark, and to the casual observer this would seem in keeping with the apparently greater number of hysterical outbursts among females which are brought under one's observation in this city. Speaking from an experience of six years' residence, a woman in any form of hysterical fit in the streets of London is a rare occurrence, while a similar exhibition in the streets of Paris is—while short of being an every day phenomenon—at least not infrequent. The treatment of these attacks—which it is safe to assume are proportionately more common in private—is, therefore, a subject of considerable interest to our French *confrères*. M. Pitres has recently made some practical remarks in this connection. Having suppressed the fussy attentions to the patient, and released her from all the physical restraint which may have been exercised over her by anxious friends, he says the next duty of the physician is to search for the antispasmodic zones by commencing in those parts in which they most frequently are found,—viz., in the ovarian and epigastric regions. They do not always exist, however; but if they do, energetic pressure made upon them will bring the crisis to an immediate termination. Another efficacious manœuvre is prolonged and gentle compression of the eyeballs. This usually results in the production of hypnotic sleep. The patient may be left in this state until she awakes herself, or she may be awakened brusquely by blowing in her eyes. M. Bernheim, of Nancy, induces hypnotism by verbal suggestion. He tells his patient that she no longer suffers, that she is about to sleep, that she sleeps, that the crisis is past, and, finally, that she is to wake up. In most cases these imperative injunctions bring the fit to an end. Another therapeutic method, of which, according to Dr. Pitres, the efficacy is incontestable, is the application of the constant current. One electrode is placed on the forehead, the other indifferently on the abdomen or lower limbs, the battery being constructed so that it is possible to reverse the direction of the current; this is done two or three times, and is in general followed by immediate cessation of the convulsions. The current must, to be successful, be fairly strong,—30, 40, and even up to 80 elements of Trouvé's battery. He points out, however, that the chief drawback to this treatment is the fact that it rarely happens that a battery may be within reach. Chemical substances, on the contrary, are more easily procured, as a rule, and the inhalation of such substances as ether, chloroform, or nitrite of amyl is often successful. Enemata of solutions of chloral hydrate are also suggested, as well as (in some rare cases) hypodermic injections of morphine; but he points out that this latter drug must be used with great caution and circumspection, as hysterical subjects very readily develop the morphine habit. With a view of preventing a recurrence of the attacks, it is well to ascertain exactly what spasmodic zones the patient may have, and, should these zones be painful or easily excited, to apply ice-bags over them, or to spray them frequently with ether. Again, should there be antispasmodic zones, it is recommended to apply not only pressure to them at the time, but to keep this pressure up mechanically in a permanent form. Dr. Pitres would allay the excitability of the nervous centres by liberal doses of chloral, or, if necessary, morphine, but he makes no mention of the bromides. Should the patient be hypnotizable, he advises that it be "suggested" to her to have no further attacks within a given time. Dr. Pitres has had a curious experience with colored glasses in the treatment of this affection. He says there are certain colors which will actually provoke an attack, while he finds other colors again which either induce hypnotic sleep in a few seconds, or bring about a feeling of calm and comfort in an equally short time; and he cites the case of a young girl, a patient of his, with whom the wearing of spectacles with red glasses had the effect of inhibiting an attack, and much delaying the recurrence of another.

TREATMENT OF CONVULSIONS IN CHILDREN.

In a paper published in the *La Médecine Moderne*, December 18, 1890, the author calls attention briefly to the usual advice of at once removing the clothes of the child affected with convulsions before giving it a warm mus-

tard bath, with cold applications to the head. The seizure is very apt to come from the digestive tube, and thus production of vomiting by tickling the soft palate, or the administration of an emetic may be of service, or a full dose of calomel, or of castor oil, may be administered. It should also be remembered that perhaps an intestinal parasite may be the starting-point of the convulsion, and that a vermifuge may be indicated. When there is cerebral hyperæmia, the application of leeches behind the ears may arrest the convulsion, or in very vigorous children bleeding may even be practised with success. Mustard plasters may be perhaps of value applied to the lower extremities, or even the compression of the carotids, as recommended by Trousseau. Inhalations of chloroform may produce relief, but it will be usually only transient, and a repetition of its employment is not without danger. Bromide of potassium combined with chloral is especially reliable when the convulsions are obstinate, 7½ to 15 grains may be given to young children, 30 to 60 grains to children a little older, and 60 to 90 grains to children approaching adolescence. To new-born children the dose of chloral should be only ¾ grain; to nursing infants 2 grains; 3 to 5 grains to children of 2 years of age, and 6 to 13 grains to children between 7 and 12 years of age. When the convulsion has once been subdued it would be well to continue the use of the bromides, prescribing bathing the head with cold water, general friction, lukewarm baths, and strict regulation of diet. With this may also be combined small doses of calomel and the valerianate and oxide of zinc.

A NON-POISONOUS, NON-IRRITATIVE ANTISEPTIC DRESSING.

In practical surgery, since the introduction and general adoption of the antiseptic method of treatment, there has been but slight difficulty encountered in preserving an aseptic condition of the wound during the operation, and the methods now employed are so simple and effectual that a surgeon can be assured by a moderate amount of caution of performing an aseptic operation: there, however, exists the great question of preserving an aseptic condition of the wound throughout its subsequent progress to recovery, without which the performance of an aseptic operation is useless. Here it has been found that so many circumstances exist as to render the task a very difficult one indeed. That this has been and is generally recognized by surgeons is shown by the many dressings introduced within the few years antiseptic surgery has been in general use. The earlier dressings were of a most complicated and expensive nature, and entailed an immense amount of work, with the frequent result that, owing to their malapplication, the aseptic condition of the wound was not preserved. As the subject became more familiar, it was found that certain of the earlier antiseptics were not sufficiently destructive to bacterial life to render a less complicated method of applying the dressings possible, so others and more powerfully poisonous to bacterial life were introduced, resulting in a more simple and comparatively cheap dressing which was strongly antiseptic. But those dressings, owing to the poisonous nature of the drugs used, were found to have a highly irritative local action, which rendered their application in many cases impossible. To obtain a non irritative dressing which should at the same time possess great antiseptic properties has been the aim of surgeons for some time past.

In the *British Medical Journal* for November 8, 1890, is a paper published by Drs. Francis T. Heuston and Charles R. Tichborne, in which the authors state that some months since they commenced to experiment with naphthalin and sulphite of zinc, and the latter proved so successful that the authors claim that they believe they are warranted in recording that salt as non-poisonous, non-irritative, and highly antiseptic, while its application is extremely simple. In applying the dressing, a piece of gauze which is to be placed in contact with the wound is usually dipped in a weak carbolic solution, though this is not essential, and then three or four layers of dry sulphite of zinc are applied to the whole, being retained in position by a simple gauze bandage.

As far back as 1870 sulphite of zinc was introduced to the profession by Dr. Tichborne as an antiseptic, but his claims as to its value seem to have attracted little attention. Sulphite of zinc is best prepared by mixing in solution six parts of zinc sulphate and five and one-quarter parts of sodium sulphite. The new salt forms slowly and falls out as a white crystalline precipitate; it is very insoluble in water, but soluble in an excess of sulphurous acid.

Sulphite of zinc exists in two conditions of hydration, as a di- or tri-hydrate according to the temperature at which it is dried. When dried at 100° C., the composition of

the sulphite present will be $ZnSO_3 2H_2O$. When dry, sulphite of zinc is a perfectly stable compound. The usual method employed by the authors is to tinge the gauze with an organic dye, a fact which affords an easy way of determining whether the gauze, however old it may be, possesses its antiseptic properties. If a little gauze is placed in water and acidulated with sulphuric acid, it at once bleaches from the free sulphurous acid; when wet or in solution, it suffers a slow oxidation, and hence its antiseptic power. The gauze should first be thoroughly washed and boiled so as to sterilize it, and then upon this gauze is poured zinc sulphate and sodium sulphite in equal parts; when thoroughly mixed the whole is allowed to stand twelve hours. The zinc sulphite is deposited in and around the fibres of the fabric in microscopic crystals, but soft and even unctuous to the feel.

Sodium sulphate of zinc of course results in the deposition which follows the union of these two substances, and while the greater part remains in solution the gauze should be passed twice under rollers submerged in water with the object of removing all traces of this sodium sulphate which might remain. The gauze may be dyed with the twofold object of watching the progress of the discharges, and for the purpose of branding it distinct from other surgical dressings.

There are two points which are generally acknowledged, first, that sulphurous acid is one of our most efficacious antiseptics; second, that the antiseptic property of this acidulous radical is perpetuated through its salts. It has been shown that sulphite of zinc is always oxidizing when in solution, and that this unstable condition of sulphite results in the production of a fluid craving for oxygen, which is antagonistic to germ-life.

The paper is concluded by the report of seventeen cases of the various forms of major operation, in all of which union by first intention appears to have been obtained.

THE ACTION OF KOCH'S REMEDY ON INTERNAL ORGANS IN TUBERCULOSIS.

At the meeting of the Berlin Medical Society, held January 7, 1891, during the debate on Dr. Fraenkel's paper on Koch's treatment of tuberculosis, PROFESSOR VIRCHOW made an address the importance of which cannot be overestimated, and of which the following is a full abstract (*Lancet*, January 17, 1891, and *Berliner Klinische Wochenschrift*, No. 2, 1891):

Limiting his remarks to facts determined by anatomical investigation, Professor Virchow said that from the time at which the practice commenced until the end of December he had examined post mortem twenty-one cases in which during life injections of Koch's fluid had been practised, and to these might be added some six or seven more examined during the present year. (A large number also have been examined by his assistants in other hospitals and elsewhere, and had yielded important facts.)

There is an obvious difference between those cases in which the changes taking place in superficial parts can be observed clinically and those where the internal organs are affected to an extent difficult to estimate by the careful clinical investigation; and it is of interest to contrast the latter with the former. Of the twenty-one cases referred to, sixteen were cases of phthisis in the limited sense,—*i.e.*, in which the lungs were especially involved. The remaining five cases comprised, 1, a well-marked case of tuberculosis of bones and joints; 2, a case presenting the rare concurrence of cancer of the pancreas with small, smooth-walled cavities in lung and apical induration; 3, an empyema in a puerperal case, which would probably have proved fatal apart from the injections; 4, pernicious anæmia, with very limited old lesions in lungs and tuberculous pleurisy; and 5, a case of arachnitis tuberculosa. In the remaining sixteen, strictly pulmonary cases, all showed more or less extensive phthisical ulceration.

Reserving for another opportunity a detailed statement of these cases, Professor Virchow proceeded to make some general remarks on the experience derived from them. Just as observation of external parts had shown that the remedy acts as a severe irritant, exciting redness and swelling, so the same effects had been well seen in the internal parts. He showed a preparation from a case of arachnitis tuberculosa in Henoch's clinic, in which there were also some old caseo-pneumonic areas in the lungs (the probable focus of the meningeal metastasis), together with recent inflammatory changes. After four injections, amounting in all to two milligrammes, the last being sixteen hours before death, the patient (a boy 2½ years old) died. Professor Virchow did not remember ever having seen so "colossal" a hyperæmia of the pia mater, and even of th-

brain itself. The pia matral vessels were extremely distended, and the brain-tissue of a dull reddish tint. In this, the only case of the kind in the series, he personally examined the tubercles in the arachnoid, but could detect no degenerative changes in them; they were well formed and of the ordinary character. Similar conditions of acute hyperæmia and swelling were also to be found in other internal organs. They had often noted an unusual deep injection of the granulation layers of old pulmonary cavities; sometimes a hemorrhagic infiltration of the walls, or evidence of recent hemorrhage into the cavity. In a man, 30 years of age, with an old rectal fistula and numerous tubercular ulcers in the colon, death followed upon hæmoptysis from an old ulcerating focus; he had been injected seven times, the last occasion when the hemorrhage set in, being thirteen days before his death. But these visible changes were not confined to such marked hyperæmic swellings, which obviously might be very transient, for there was not the least doubt that *actual inflammation*, with *active proliferation*, occurred to a considerable extent. This is well shown at the margins of ulcers and in the neighboring lymphatic glands, especially the bronchial and mesenteric. The glands were most markedly swollen, that form of medullary swelling peculiar to acute irritation and due to a rapid proliferation of the cells within the gland. This change is often associated with obvious leucocytosis, which may be assisted by the infiltration of white blood-corpuscles around the tubercle. Sometimes these inflammatory swellings are dangerous. Thus, in the larynx, although the ulcers may become healthier, the neighboring tissue enormously swells, and may produce a critical degree of stenosis. Sometimes the change may assume a phlegmonous type, comparable to what is seen in œdema of the glottis and retro-pharyngeal abscess, as illustrated in a case seen this month (January). No doubt it is difficult to assert that any such inflammation is due to the injections, for there is no criterion for any differentiation; nor was he prepared to say precisely how this kind of inflammation may be recognized and distinguished from other inflammatory lesions arising in the course of phthisis. But in the lungs certainly there are lesions which are exceptionally peculiar.

Among the fatal cases of ulcerative phthisis the great majority showed widespread changes of recent date, mostly in the lungs, but also associated with pleurisy of very severe type, simple and tubercular, hemorrhagic, and not rarely bilateral. The lung changes may be separated into two seemingly very different categories. The one corresponds to what is styled "caseous pneumonia," or, anatomically, "caseous hepatization." It might be thought very doubtful whether this change was in any way connected with the injections. Professor Virchow would himself have doubted this were it not that some of the cases showed it in a special degree, and he exhibited a portion of lung which had undergone caseous hepatization to an extent the like of which he had not seen for years. The lungs were large, their lower lobes, especially the right, as voluminous as in ordinary hepatization; but the foci were so thickly massed as to leave hardly any parenchyma between them. It was like a piece of black sausage richly laden with fat. The non-caseous parts were blackish and sharply demarcated from the caseous. The man was 33 years old; he had had six injections, the last four weeks before death, and the injections were suspended because of supervention of continued fever and infiltration of the lower lobes. This infiltration started just after the injections, for previously there were only signs of induration at one apex, where was afterwards found an old indurated focus. In other cases, also, the condition of the lungs similarly differed from what is usually seen in phthisis; in five of the cases there were more or less large masses of caseous hepatization, but not approaching the extent of the case related.

Another change, which is certainly inflammatory, is of a more diffuse character, although again not absolutely distinctive. The types of pneumonia liable to arise in the course of phthisis may be placed in three different categories. There are the caseous, the ordinary fibrinous, and the *catarrhal*, so-called smooth pneumonias, marked essentially by cell accumulations in the alveoli. One may see all these forms in a case of phthisis, but in not one of the injected cases was simple fibrinous pneumonia present. In fact, the "injection pneumonia" resembles the catarrhal type, but with certain differences. Catarrhal pneumonia, as ordinarily met with in phthisis, exhibits a moderately fluid collection in the alveoli, which can only be slightly expressed from them. Sometimes the contents are much more watery, like brine, and it was this which led Laennec to speak of gelatinous infiltration preceding tubercular infiltration. But the product in these cases is not gelatinous; it is rather watery

and turbid; it might be called cloudy infiltration, and calls to mind a *phlegmonous* condition. In some parts it is more opaque; in parts it has a superficial likeness to caseation, but without its dry character, and there is no difficulty in distinguishing the two. The catarrhal phlegmonous condition is softer, moister, and laxer, as in a specimen shown, where around large ulcerating cavities in the apex of lower lobes were caseous masses and catarrhal inflammation. Two other specimens also showed caseous and catarrhal hepatization, which condition occurred in seven out of the sixteen cases examined last year. A further point of difference from ordinary catarrhal hepatization consists in the occasional occurrence of areas of softening in the midst of the hepatized foci, producing rapid excavation; for instance, in the middle of the lower lobe, just as in gangrenous broncho-pneumonia. This result seems to point to the operation of a stronger irritant than that which is usually regarded as the cause of catarrhal pneumonia. Professor Virchow is of opinion that, in some of these cases at least, the inflammatory processes are analogous to those excited in the external parts after injection, which vary in intensity with the individual and the special features of the case.

Another phenomenon has been noted which requires confirmation by thorough clinical observation; it is the outbreak of *recent tubercles* in these patients. He could only speak with much reserve on this point, since we have no fixed data as to the duration of small tubercles,—*i.e.*, the *submiliary form*,—and cannot judge positively as to their age. Generally they are regarded as being of recent formation. Clinical observation in certain cases has shown an eruption of tubercles on the laryngeal mucous membrane after injection. Small tubercles have become almost suddenly visible in places which appeared to be perfectly free from them, and they have rapidly given rise to fresh ulcers. It is asserted that this shows the tubercles to have existed prior to the injection, but that they have not been visible. They have been attacked and destroyed by the remedy, and thereby changed into ulcers. Professor Virchow was unable to controvert this statement as regards the recorded cases, but in his own examination of those parts, which he has always regarded as most suitable for the observation of these recent formations,—viz., serous membranes,—has revealed *the eruption of very recent tubercles under conditions which render it very unlikely that these were of old date.* This is especially seen in the pleura, pericardium, and peritoneum. He has never been able to confirm the notion that the tubercles were strongly attacked by the remedy and mortified, for in all these cases the submiliary tubercles in question were quite intact, even following injections made some weeks previously. Hence he is the more inclined to the notion that their eruption first took place *after* the injection.

Owing to the great difficulty in discriminating precisely these very fine forms of tubercle in the lungs themselves, he would speak only of regions, such as the mucous membrane of the larynx, where miliary tubercles first appeared after injection, or where after more prolonged injections quite recent tubercles have been seen in the membrane. He showed an intestine—procured this month—in which there was a very recent submiliary eruption in the vicinity of old ulcers; the patient, a man 41 years old, also had recent tubercles in the pericardium.

In endeavoring to explain these fresh eruptions, he remarked that if one admits that every tubercle is due to bacilli, the study of such remote parts as the pericardium deserves special attention. In another case the epicardium had at one spot, not in contact with the affected part of the lung, a small group of four such miliary tubercles surrounded by marked hyperæmia. There seemed no other explanation than that their germs had come there by metastasis; and why, he asks, should not the metastatic transferrence of liberated bacilli be deemed a source of more generalized infection? For Professor Koch states that the bacilli resist the action of the remedy, nor indeed are they destroyed, and therefore the possibility must be recognized that the softening process excited by the remedy makes the degenerative products more fluid and more liable to be carried away to create foci elsewhere. The idea is not far fetched, and is linked with another,—viz., the infiltration, under the treatment, of a whole lower lobe into foci of caseous hepatization, suggesting that material set free from the upper lobe by the destructive processes, and not coughed up, has been sucked into the lung, and has excited a kind of caseous "Shluck-pneumonia."

Professor Virchow said he felt bound to express these ideas in order to unite with them the warning that still greater caution should be used in operating on cases where the patient has not the strength or the h

of completely coughing up the softened material, and where there is great possibility of the conveyance of this material to other parts of the lung to excite therein fresh foci. Another point on which Professor Koch lays stress as the main effect of his remedy is the destructive process itself. There is no doubt that such an action does take place in many parts; but it is not quite clear why this mortification does not always occur, as, for instance, in the cases of submiliary tubercles referred to. Professor Virchow admitted,—as had been described by some earlier observers,—in tubercular pleurisy, for instance, that, especially when the tubercles increased in size, they assume an unusually cloudy, yellowish aspect, and show definite microscopic changes. But at other times, even when injections are continued to the day before death, this change does not occur. Large tubercles may even appear very resistant. They had lately a very remarkable case of a boy, 3 years of age, with tuberculosis of the vertebræ and long bones, and where large tubercles were found in the brain. The injections had reached .012 gram. It was a surgical case, in which spinal caries with psoas abscess and much disease of the joints and bones of the lower limbs existed. At the necropsy there were as many as seven so-called "solitary tubercles"—*i.e.*, large caseous masses—in the brain and cerebellum; but neither in them nor in their vicinity were any marked changes to be seen. There were a few spots of softening, but not of special import, and certainly none of the nodules showed any marked destruction.

Professor Virchow next drew attention to the conditions observed in cases of phthisis, in *ulcers of the intestine* and in the *ulcers of the respiratory organs, especially in the lungs.* As regards the intestine, there could be no question as to the occurrence of mortifying processes similar to those observed in lupus, especially in the older ulcers of wide extent and thickened margins, where there is much fresh submiliary eruption to be seen together with extreme mortification. He showed the specimen from the case which also had pericardial tubercle, in which the destruction of the intestinal ulcer had invaded the serous coat. Had the man survived two days longer, perforation must have occurred. This was so in another case lately related by Professor B. Fraenkel where death occurred from perforation. Although such mortification and perforation do take place in tubercular ulceration, yet it was remarkable to have two such instances within two months of severe cases where the mortifying process was in rapid progress. The same is true of ulcers in the organs of respiration, in which very rapid destruction takes place, and the unusually large size of the detached masses must obviate the possibility of their being expectorated, and thereby favor their retention and aspiration with its consequences. Professor Virchow showed also a specimen of very severe laryngeal tuberculosis (from the same case as the pericardial and intestinal specimens referred to) in which twenty injections had been practised, the last on the day preceding death. The specimen showed a recent eruption, involving the whole extent of the larynx, of most exceptional severity. Another preparation showed recent caseous hepatization, from a case in which six injections were made, the last four days before death; another where three injections were made, the last one a week and a half before death, and in which cheesy foci and tracts of diffuse inflammation were present; and, lastly, a preparation obtained that morning, showing a spreading abscess in the lung, starting from bronchiectasis in the lower lobe.

THE COMPOSITION OF PROFESSOR KOCH'S REMEDY FOR TUBERCULOSIS.

The following is a translation of PROFESSOR KOCH'S second communication on the action of the remedy for tuberculosis, with an account of his method of preparation of the remedy (*British Medical Journal*, January 7, 1891, and *Deutsche Medicinische Wochenschrift*, January 15, 1891).

"Since the publication of my experiences with a new remedy for tuberculosis two months ago, many doctors have been put in possession of the remedy, and have thus been enabled to make themselves acquainted with its qualities by their own experiments. As far as I can judge by the publications that have appeared on the subject, and the letters addressed to me, my statements have, on the whole, found full confirmation. That the remedy exercises a specific action on tuberculous tissue, and can in consequence be employed as a very delicate and certain reagent in searching out hidden, and diagnosticating doubtful, tuberculous processes, is agreed on all sides. And in regard also to the therapeutic effect of the remedy, most accounts agree that, in spite of the relatively short duration of the treatment, many patients show improvement, varying only in degree.

In not a few cases I am informed that cure even has been attained. Only in some exceptional cases has it been affirmed that the remedy may not only be dangerous in too far advanced cases,—which is freely admitted,—but that it directly hastens the tuberculous process; that it is, in fact, harmful *per se*. I myself have had the opportunity during a month and a half of collecting further experiences regarding the therapeutic effect and the diagnostic value of the remedy in about one hundred and fifty cases of various forms of tuberculosis, and I can only say that all I have lately seen is in harmony with my former observations, and that I have nothing to retract of what I have before stated. So long as the only point of importance was to judge of the correctness of my statements, it was not essential to know what the remedy contains and what its origin is. On the contrary, it was clear that subsequent experiments would be all the more unprejudiced the less was known of the remedy itself, but now that such experiments in sufficient number have been made, and have proved the importance of the remedy, the remaining task is to study the remedy beyond the application it has hitherto found, and if possible to apply the principles which lie at the foundation of its discovery to other diseases. This task, of course, demands a full knowledge of the remedy.

"I therefore think the right moment has come to make the necessary statements which follow before I discuss the remedy itself. I think it imperative for the better understanding of its action to trace shortly the steps that led me to its discovery. If a healthy guinea-pig be inoculated with a pure cultivation of tubercle bacilli, the inoculation wound generally becomes sealed, and seems to heal up during the next few days. It is only in the course of from ten to fourteen days that a hard nodule is formed, which soon opens, forming an ulcerating spot, which persists until the death of the animal; but the case is very different if an already tuberculous animal be inoculated. The most suitable animals for this experiment are those that have already been successfully inoculated four to six weeks previously. In the case of such an animal also the small inoculation wound becomes sealed at first, but no nodule is formed, a peculiar change taking place at the point of inoculation. Already, on the first or second day, the spot becomes hard and dark-colored; and this is not confined to the point of inoculation, but spreads around to a diameter of .5 to 1 centimetre. During the next few days it becomes more and more clear that the epidermis thus changed is necrotic. Finally, it is thrown off, and a flat, ulcerated surface remains, which generally heals quickly and completely, without carrying infection to the neighboring lymphatic glands. Thus the inoculated tubercle bacilli act quite differently on the skin of a healthy guinea-pig and on that of a tuberculous one. But this remarkable action does not belong exclusively to living tubercle bacilli, but also in the same degree to dead ones, whether killed by low temperatures of long duration, which I at first tried, or by boiling heat, or by certain chemicals.

"This peculiar fact having been ascertained, I followed it up in all directions, and it was then further found that pure cultivations of tubercle bacilli thus killed, after they have been ground down and suspended in water, can be injected under the skin of healthy guinea-pigs in large quantities without producing anything but local suppuration. Tuberculous guinea pigs, on the other hand, can be killed by an injection of very small quantities of such suspended cultures, the time being from six to forty eight hours, according to the dose; a dose which is just insufficient to kill the animal is sufficient to produce a widespread necrosis of the skin in the region of the point of inoculation. If the suspended matter be still more diluted, so that it is scarcely turbid to the eye, the animals remain alive; and if the injections be continued at intervals of one or two days, a noticeable improvement in their condition soon sets in; the ulcer at the point of inoculation becomes smaller, and finally cicatrizes. This is never the case without such treatment. The swollen lymphatic glands become smaller, the condition as regards nutrition improves, and the progress of the disease is arrested, if it is not already so far advanced that the animal dies of debility.

"These facts formed the foundation of a therapeutic method against tuberculosis. But an obstacle to the practical employment of such suspensions of killed tubercle bacilli was found in the phenomenon that the tubercle bacilli are by no means reabsorbed, nor do they disappear in any way, but for a long time remain unchanged in their position, producing smaller or larger suppurating centres. Thus it was clear that in this method the curative effect on the tuberculous process is obtained by a soluble substance, diffused, so to speak, into the fluids that surround the tubercle bacilli, and transferred without delay to the circulating fluids of the body, whereas that whic-

has the pus-forming quality seems to remain behind in the tubercle bacilli, or, at any rate, to be only very slowly dissolved. Thus the only important thing to be done was to carry out the process which takes place within the body *outside* of it also, and, if possible, to extract and isolate the curative substance from the tubercle bacilli. This probably required much work and time before at last I succeeded, by the help of a forty to fifty per cent. solution of glycerin, in extracting the active principle from the tubercle bacilli. My further experiments on animals, and finally on human beings, were made with liquid thus obtained, and in this way also the liquid which I let other physicians have in order to repeat the experiments was obtained. The remedy with which the new therapeutic treatment of tuberculosis is carried out is, therefore, a glycerin extract of pure cultivation of tubercle bacilli.

"Besides the active principle there pass from the tubercle bacilli into the simple extract all other substances soluble in fifty per cent. glycerin, and therefore there is found in it a certain quantity of mineral salts, pigment, and other unknown extractive substances. Some of these substances can be removed from it without difficulty, for the active principle is insoluble in absolute alcohol, and can be precipitated by it, not pure, it is true, but in combination with other extractive substances likewise insoluble in alcohol. The coloring-matter, too, can be separated out, so that it is possible to obtain a colorless dry substance from the extract, which contains the active principle in a much more concentrated form than the original glycerin solution. But this purifying of the glycerin extract has no advantages as regards practical application, as the substances thus removed have no action on the human organism, and the process of purifying would, therefore, only cause unnecessary expense. The constitution of the active principle can as yet be only a matter of conjecture. It seems to me to be a derivative of albuminous bodies, and to be in close relation to them, but it does not belong to the group of so-called toxalbumens, as it can withstand high temperatures, and in the dialyzer passes quickly and easily through the membrane. The quantity of active principle present in the extract is, in all probability, very small; I estimate it at fractions of one per cent. Thus, if my assumption be correct, we have to deal with a substance the action of which on the tuberculous organism far surpasses that of the strongest drugs known.

"Various hypotheses may, of course, be formed as regards the specific mode of action of the remedy on tuberculous tissue. Without in any way affirming that my view is the best possible explanation, I imagine the process to be as follows: The tubercle bacilli in their growth produce in the living tissues, just as in the artificial cultivations, certain substances which have various but always deleterious influences on the living elements of their surroundings,—the cells. Among these substances is one which, in a certain concentration, destroys living protoplasm, and causes it to undergo a transformation into the condition called "coagulation-necrosis," by Weigert. The tissue having become necrotic, this condition is so unfavorable to the nutrition of the bacillus that it is unable to develop further, and finally in some cases it dies off. In this way I explain the remarkable phenomenon that in organs freshly attacked by tuberculous disease—for instance, in a guinea-pig's spleen or liver filled with gray nodules—numerous bacilli are found, while bacilli are rare or entirely absent when the enormously-enlarged spleen consists almost entirely of whitish substance in a condition of coagulation-necrosis, such as is often found in guinea-pigs which die of tuberculosis. A solitary bacillus, however, cannot produce necrosis at a great distance, for as soon as the necrosis has reached a certain extent, the growth of the bacillus, and, in consequence, the production of the necrosis-producing substance, diminishes, and thus a sort of mutual compensation sets in, and to this it is due that the growth of isolated bacilli is so remarkably restricted, as, for example, in lupus, in scrofulous glands, etc. In such cases the necrosis only extends over a part of the cell, which then, in its further growth, assumes the peculiar form of a giant cell. I thus follow in this statement of my views the explanation of the growth of giant cells first given by Weigert. Now, if the necrosis-producing substance were artificially added to that contained in the tissue surrounding the bacillus, then the necrosis would extend further, and thus the conditions of nutrition of the bacillus would be much more unfavorable than is usually the case. Then not only would the more completely necrosed tissues disintegrate, slough, and—where this is possible—take with them the enclosed bacilli, carrying them outward, but the bacilli would also be disturbed in their growth to such an extent that they would die off sooner than is the case under ordinary conditions. It is in calling forth such changes that to my mind the action of the remedy seems to consist. It contains a certain amount

of the necrosis-producing substance, of which a correspondingly large dose has a deleterious influence—even in healthy persons—on certain elements of the tissues, probably on the white blood-corpuscles or cells closely related to them, thus giving rise to the fever and the whole peculiar complex symptoms. In tuberculous persons a much smaller quantity suffices to cause, at certain spots,—that is, wherever tubercle bacilli vegetate and have already impregnated their surroundings with the necrosis-producing substance,—a more or less extended necrosis of cells, with the accompanying symptoms affecting the entire organism. In this way it is possible to explain—at least for the present—in a provisional way the specific influences which the remedy in certain well-recognized doses exercises on tuberculous tissue, as well as the possibility of increasing the doses in so remarkable a fashion; and, finally, to explain the curative effect which the remedy undoubtedly possesses where the circumstances are at all favorable."

Reviews.

CYCLOPÆDIA OF THE DISEASES OF CHILDREN, MEDICAL AND SURGICAL. THE ARTICLES WRITTEN ESPECIALLY FOR THE WORK BY AMERICAN, BRITISH, AND CANADIAN AUTHORS. Edited by John M. Keating, M.D. Vol. I.
Philadelphia: J. B. Lippincott Company, 1890.

A work of the high aims of the present cyclopædia must to-day be as nearly perfect as skill and research can make it to insure a successful reception. It must mirror, up to the day of its publication, the most advanced discoveries of the time; must be, till displaced by subsequent work and investigation, an absolute authority. How well the authors—"American, British, and Canadian"—have labored, how perfect their work is, the student and practitioner can only discover by patient reading and study. But the names of the authors are a warrant that they are eminently fitted for the task, since in many cases they are already well known for honest and excellent work in the special branch of which they treat.

Part I. of Vol. I. is devoted to "General Subjects," and contains excellent articles on "The Anatomy of Children," by Geo. McClellan, M.D.; "The Physiology of Infancy," by Angel Money, M.D.; "Diagnosis," by James Finlayson, M.D.; "The Influence of Race and Nationality upon Disease," by J. Wellington Byers, M.D.; "Outlines of Practical Bacteriology," by E. O. Shakespeare, M.D.; and we may remark that, as a professed cyclopædia of diseases of children, this work embraces a vast amount of information equally applicable to adults. "Maternal Impressions," by Wm. C. Dabney, M.D.; "Diseases of the Fœtus," by Barton Cooke Hirst, M.D.; "The Care of the Child at and immediately after Birth, in Health and Disease," by R. A. F. Penrose, M.D.; "Closure of the Ductus Arteriosus and of the Umbilical and Hypogastric Arteries," by J. Collins Warren, M.D.; "Injuries of the New-Born," by Theophilus Parvin, M.D.; "Infant-Feeding—Weaning," by T. M. Rotch, M.D.; "Wet-Nurses," by Wm. H. Parrish, M.D.; "Diet after Weaning," by Samuel S. Adams, M.D.; "Nursing of Sick Children," by Miss Catharine Wood; "Nursery Hygiene," by L. M. Yale, M.D.; "Dentition," by John Dorning, M.D.; "Puberty: Its Pathology and Hygiene," by Thos. Moore Madden, M.D.

We have enumerated the articles in Part I. and their authors because in many respects this portion of the work is most distinctive. These articles are all excellent monographs. It would be almost unfair to discriminate, but perhaps the reader, like the reviewer, will be especially attracted by the article on "Diagnosis." This is not only erudite, but captivating. "Influence of Race and Nationality" is another attractive subject which has been wonderfully well handled. Dr. Penrose has embodied in his article all the vast experience of which he is master, and "Infant-Feeding" is a complete epitome of the best knowledge on the subject, and though Dr. Finlayson very properly derides the early diagnosis of "teething" as one that covers ignorance and carelessness in the practitioners, Dr. Dorning will show us exactly what mischief abnormal teething may do in his article on that topic.

Part II. is devoted to "Fevers and Miasmatic Diseases," and opens with an article by Dr. Wm. Pasteur on "Fever." This portion of the volume, with slight exceptions at the end, travels the beaten path,—typhoid, typhus, and relapsing fevers, etc. All the articles are excellent.

"Diphtheria," by Dr. J. Lewis Smith, is, as might be confidently expected, a monograph of the greatest value to the student and practitioner. To the easy and captivating style the author has united great information, great experience, and thorough work. All that we know of diphtheria, past and present, he

gives us, with the grace and force of the true writer, who, having assimilated all knowledge, makes it forever his own. The author draws a happy picture of the primeval America, free, till European invasion, from all the contagious diseases which the world has derived from the distant and mysterious East, and among them all he places diphtheria first as the most deadly, the most persistent, and distressing. He says, "It is to be, from appearance, above all other maladies, the scourge of America in the future." These grave words add additional force to the thorough study which he gives of disinfection, on which alone we must rely for any hope of displacing the pest which has fastened on us.

The thermometry of diphtheria he considers as still involved in mystery. Temperature tells us less than in any other disease. Its use is mainly to tell us of the amount of local inflammation and its severity. Nasal diphtheria the author acknowledges to be difficult of early diagnosis, and often exists unsuspected. He does not mention the fact that suspicion should be excited by enlargement of the lymphatics of the neck, posterior to a line dropped from the lobe of the ear, swelling anterior to this being carried by deposit on the tonsils and pharynx, nor does he hint at the possibility of nasal diphtheria being a variety of the disease due in many cases, perhaps in all, to contagion primarily derived from animal diphtheria. His observations on diphtheritic paralysis are the best we have met with, and he reminds the reader that the worst cases of diphtheria which die, would, if they survived, probably have the most marked paralysis. A hint to which the reviewer would add, that the rather remarkable frequency of paralysis after apparent recovery under the mercurial treatment,—a frequency which has been used to disparage that treatment,—only shows that mercurials, used as at present, rescue desperate cases, which, under other methods, would have perished, and given no signs of paralysis in consequence.

Diphtheria gives, as Dr. Smith says, the largest number of cases of heart-failure of any disease; but, in view of the world's recent experience with influenza, we would prefer to modify the statement to "*fatal* heart-failure," since influenza afforded multitudes of cases where the heart weakness was just barely compatible with life.

"Pertussis," by T. M. Dolan, M.D., F.R.C.P., is a rather gloomy chapter. The author is by no means enthusiastic on the therapeutics of whooping-cough, and entertains a somewhat low opinion of the various remedies advanced of late. He alludes to the recklessness of the general public in regard to a disease, which, he says, is the third cause of death in London among the diseases of infancy, but not so many years ago. It held for a long time the place of third in the general London mortality, as it did in New York and Philadelphia. Since which, in the latter cities at least, it has descended very much lower in the list; in fact, there is scarcely a disease in which therapeutics has shown so much usefulness as in whooping-cough. With the discovery of the virtues of belladonna the work began, and there are now at least six remedies unknown thirty years ago, any one of which is vastly more efficacious than the accumulated Pharmacopœia before that time. The author mentions the burning-sulphur cure, which many have used with success, but does not speak in favorable terms of quinine, which will do marvels if used boldly and in *solution*, since in pill form it is quite useless. Belladonna and alum are his main reliance, with the ordinary treatment for catarrh in the early stages. Spraying the fauces with various agents is barely alluded to, and no mention is made of the spray of bichloride of mercury, 1 in 10,000, which certainly allays the paroxysms, and, in the opinion of some recent observers, often shortens the disease.

In "Variola," by A. D. Blackader, M.D., we have a very good article, as suitable for adult variola as for that of children. The writer of the article fails in his short historical sketch of the disease to allude to the interesting fact that, prior to vaccination and the time of Jenner, variola was always classed as a disease of infancy and childhood, along with measles, pertussis, etc. This fact, which of itself proves the efficacy of vaccination, is at least worthy of passing notice. The author believes that any treatment which tends to prevent the full natural expression of the eruption, more or less endangers life.

Dr. W. T. Plant, who writes on "Vaccination," has evidently not studied Dr. Crookshank's recent work on the "History and Pathology of Vaccination," else would he have moderated somewhat his praises of the illustrious Jenner, and have been obliged to take a somewhat wider though less self-satisfied view of the whole subject. Especially would he have somewhat modified his remarks on the "degeneration of lymph" and "forms of lymph."

"Rheumatism" and "Malaria" are two remarkably able articles, and Dr. Guiteras has given us another on "Yellow Fever." This probably will not in our immediate section of the country be of practical value, but for the physicians of the South is invaluable.

Dr. Wm. Wright Jaggard's article on "Joined Twins" is somewhat of a variety. It, like many other articles in the book, is profusely illustrated, and contains considerable new matter on this interesting subject.

Dr. Bartholow, in "General Therapeutics of Children's Diseases," has given us an extremely scientific treatise.

Taken all in all, we think that Vol. I. fully sustains its claims, and that until displaced by some newer work, it deserves to rank first in the estimation of the profession. The articles are all good, and many of them are above mere praise. Their field is so wide that their influence on the profession will reach far beyond their mere bearing upon the diseases of infancy and childhood. Teaching no limited specialism, but giving us a grand, broad view of disease as something which links together child and adult, young and old, and with which we are to contend on principles which affect all ages and all races in all the varied climates of the world. E. W. W.

Correspondence.

PARIS.

(From our Special Correspondent.)

Koch's Lymph in France—Hypnotism in the Hospitals and before the Courts—Poisoning by Chloride of Barium—Retinol as a Phosphorus Solvent—Opium Eruptions.

Koch's lymph has, of course, been the object of many experiments in America; hence the results of similar investigations made here cannot fail to interest you. As regards its value in the treatment of lupus, an important preliminary report has been presented to the Society of Dermatology and Syphilography by a commission of physicians attached to the St. Louis Hospital. Thirty-two patients were inoculated, beginning from November 30, 1890. Some of the features observed are reserved for a future report, but, for the present, the attention of the association has been called to the following points so far established,—viz., 1, irregularity of the general action; 2, its dangers; 3, precautions necessary to avoid, or, at least, lessen, such dangers. Respecting the first point, the committee found the general reaction to be far from possessing the schematic characters announced by Koch. The local reaction, besides, was not always proportionate to the general. For instance, a young girl, 14 years of age, at the Necker Hospital, after three inoculations, still presented intact a large nodule of myxomatous lupus, the most characterized type of tuberculous lupus. In several patients an intense reaction was seen to follow the injection of half a milligramme of the lymph, and very different effects proceeded from the same doses. A woman, inoculated three times, at ten days' interval, with two milligrammes, was, after the third operation, taken with symptoms which nearly carried her off,—namely, pulmonary congestion, hæmaturia, scarlet-like rash with vesico-pustules and purulent blebs. Lastly, the febrile reaction much differed in length with different patients. 2. Dangers of the general reaction. The lymph produces the effects of a very active pyretogenous agent, spreading congestion and inflammation through the whole economy, but in a very unequal manner. The diseased organs are the most likely to be congested, but viscera, apparently most healthy, may equally suffer. Bronchial and pulmonary congestion are most frequent. Symptoms of myocarditis and endocarditis have been often observed; also albuminuria and hæmaturia, as well as a tumefaction of the face resembling erysipelas. 3. Precautions. It has been found necessary to gradually decrease the injections and lengthen the intervals between them. The beginning dose should be ½ milligramme, to be increased by ½ milligramme until the reaction brings the temperature up to 39° C. (102° F.). For the subsequent injections the dose should not be increased as long as the temperature mentioned is attained. There should be from four to eight days' interval between the injections.

As regards tuberculosis, especially since the last reports from Germany, physicians feeling very reluctant to try the remedy on man, and patients in some hospitals having absolutely refused to submit to any lymph inoculation, another procedure has been resorted to. Steps have been taken for a full systematic trial of the remedy on animals, and as cows are subject and often victims to tuberculosis, agricultural societies have, at their own expense, undertaken to supply the ways and means to carry on the experiments in a thorough scientific manner. Eminent physicians and veterinarians, under the direction of Professors Ver-

neuil, Chauveau, Cornil, Villemin, and others, have taken the matter in charge, and will proceed on the plan that was so successful when Pasteur's charbon vaccine was first presented and placed on trial. It will be substantially as follows: Three lots, of five cows each, will be selected and set apart. Tuberculosis will be communicated, at the same time, to the animals of the first two lots. As soon as the first set of cows indicate that the disease has affected their system, they will be immediately inoculated with the lymph. The changes noted will indicate the effects of the remedy on tuberculosis in the first degree. For the second set of cows, the lymph will be injected only two months after the disease has become manifest. The second observation will thus bear on animals suffering from the affection in the second degree. The third set will not be submitted to tuberculosis infection, but kept to serve as points of comparison with the others, and later on, if still in sound health, will be inoculated with Koch's lymph to verify his claim that it has no effect on healthy subjects.

Hypnotism continues to attract no little attention, both in medical and other circles. Among physicians, Dr. Luys, our old acquaintance, remains more persuaded than ever of the efficacy of hypnotism, in its various branches, as a curative and therapeutic agent. Many are disposed to simply scoff at the doctrine as unworthy of discussion, and it must be confessed charlatans and self-deluded persons have thrown some discredit on hypnotism, but the standing and reputation of Dr. Luys, a member of the Academy of Medicine and a hospital physician, are such that, at least, respectful consideration must be paid to his opinions. At a recent meeting of the Hospitals' Medical Society he read the statistics of the patients treated during the year 1890 at the Charité Hospital by the various therapeutic methods derived from hypnotism,—namely, fascination, transfers and magnetic crowns combined with electricity. Out of one hundred and twenty-eight, there were sixty-seven considered cured, fifty-one improved, and ten unimproved. Hysterics make up the main portion of the patients,—that is, forty-nine; next in number are the paralytics. Epileptics were equally benefited, and so were patients suffering from neuralgias, writer's cramp, and various psychological troubles derived from cerebral overwork. As regards obstetric cases, women have been delivered without pain or danger by means of fascination with bright objects. It must be remarked that no medicine was administered at all during treatment; only epileptics were given prolonged baths, and debilitated patients tonics. Finally, according to the statistics, hypnotic methods applied to the treatment of nervous diseases, both acute and chronic, have cured fifty-two per cent. of the cases. So far so good. In practical life, however, hypnotism has not been quite a success. In a case now celebrated, and probably as familiar to the American as to the European reader,—that is to say, the Gouffé murder trial,—hypnotism was, for the first time, in a criminal case, set up as a defence for one of the prisoners. Michel Eyraud and Gabrielle Bompard, as you doubtless know, waylaid their victim and hanged him to death for the purpose of robbery, after which they escaped to America, where, for more than a year, they roamed over the continent between New York, Montreal, Vancouver, San Francisco, and Mexico, until they fell into the hands of the French police, Gabrielle by voluntary surrender, and Eyraud through being arrested in Havana by the local authorities. On their trial, the plea for the woman was that she had been hypnotized by Eyraud, and consequently was not responsible for her actions. A medical commission, composed of Drs. Brouardel, Molet, and Ballet, who had given Gabrielle a thorough examination while in prison, appeared for the state, and Dr. Sacreste and Professor Liégeois gave evidence for the defence. The report presented by Dr. Brouardel on behalf of the commission bore very hard on the prisoner. In a most lucid manner, Dr. Brouardel set forth the conclusions arrived at. "Gabrielle Bompard," he said, "is perfectly responsible for her doings; we found in her no trace of insanity. From her infancy, although her physical development has been somewhat anormal and irregular, there is nothing to show that her mental faculties have been in any way injured. Morally, she is altogether vicious, but intellectually she is decidedly bright, writes wonderfully well, has great facility of elocution, and enjoys remarkable memory. She is, no doubt, hysterical, and can easily be hypnotized, as we experienced with her consent, under the promise that the murder would not be alluded to. We remarked that even in the hypnotic state she kept full control of herself." In answer to a juryman, Dr. Brouardel replied that hypnotized subjects may be compelled to act against their will, but only in very simple actions. It is different, however, when complicated actions are concerned or when their innate feelings are shocked, as subjects never completely

lose consciousness. So at the Salpêtrière, two females, hypnotized, having been suggested to undress themselves and take a bath before several persons, one of them was going to obey without demur, and the other resisted and had a nervous attack. To which Dr. Ballet added: "No crime has ever been committed under the influence of hypnotic suggestion, and all the cases on record are what may be called laboratory crimes." Dr. Sacreste's evidence for the defence was of particular interest, because he knew the prisoner from her infancy. He said he hypnotized her many times, with her father's consent. He found her to be easily put to sleep. On one occasion it was for a dental operation, and she felt no pain therefrom. Another time, before company, he made her eat a raw potato, which, at his suggestion, she declared to be an excellent pear, and made her drink, under the name of champagne, some water, which made her tipsy. In his opinion, she could most easily have been hypnotized by Eyraud, and consequently be irresponsible for her share in the crime. Unfortunately, Dr. Sacreste was obliged to confess that when Gabrielle began to fall into bad ways, her father asked him to try hypnotism on her, but he utterly failed to improve her behavior. Professor Liégeois, who came next, is a professor at the Nancy Law School and one of the leaders of the new hypnotic doctrine. He made a very long speech, chiefly composed of examples and anecdotes, illustrating the vagaries which may be committed under hypnotic suggestions, and gave it as his firm opinion that Gabrielle had been entirely under Eyraud's influence, to which Dr. Brouardel replied that Eyraud's influence had merely been that observed between two persons living together, and that Gabrielle's influence on Eyraud was as great. The jury did not accept the theory for the defence. The verdict, which would have been one of acquittal had Gabrielle been irresponsible, was one of murder, with extenuating circumstances; that is the usual indulgence shown to a woman implicated in a crime with a man. The jury, in fact, "took no stock" in hypnotism. Eyraud was sentenced to death, and Gabrielle Bompard to twenty years' hard labor.

Poisoning accidents with chloride of barium are of rare occurrence, the salt not being much found outside of chemical laboratories. For this reason, and also owing to some interesting particulars, the following case deserves to be mentioned: A workman employed in a soap manufactory at Saint-Denis, near Paris, having been advised to take sulphate of magnesium, procured the first dose from the regular pharmacist. But for the second dose he applied to the chemist of the works, prevailing upon him to give him two ounces of a white salt taken from an old bottle in the laboratory, which was labelled "Sulphate of Magnesium." According to directions, he dissolved the two ounces in two tumblerfuls of water, and drank about one-third of the solution. He was almost immediately taken with violent vomiting, then with sanguinolent diarrhœa; and, the nature of the poison being at the time unknown,—in fact, it was thought to be oxalic acid,—the treatment was of no avail, and he died in a few hours. The post-mortem was made by Drs. Ogier and Socquet, who found by analysis that the death had been caused by the ingestion of about 20 grammes (5 drachms) of chloride of barium. The lungs were slightly congested; the heart cavities contained a little coagulated blood and thick liquid black blood; the stomach held 75 cubic centimetres (2½ ounces) of brownish liquid; the stomach mucous membrane, much swollen; kidneys congested; intestines, brain, and meninges unaltered. On analyzing the viscera, the important remark was made that out of the twenty grammes of barium chloride swallowed, barely ½ gramme (8 grains) in all could be found, most of the poison likely having been rejected during vomiting and purging. The repartition of the barium, either as chloride or sulphate, among the various viscera, was rather unexpected. The stomach and intestines, for instance, contrary to all provisions, contained no chloride, and merely traces of the sulphate. The liver, kidneys, lungs, and heart's blood held appreciable quantities of both chloride and sulphate of barium. There, again, expectations were at fault, as it was not thought possible that the chloride could escape being turned into sulphate before reaching these parts of the body. Without taking it for granted that this distribution of the poison be an absolute rule, it was noticed that the same proved to be the case with a dog purposely poisoned with 2 grammes (½ drachm) of chloride of barium. The animal, by the way, a 17-pound one, died in four hours, and presented precisely the same internal lesions above described. In a medico-legal point of view, it should not be lost sight of that a small quantity of barium chloride found in the stomach does not indicate a small amount of poison taken. Owing to the vomitings, it is most likely that, however large might have been the dose, but little will be found in the economy.

At the Society of Therapeutics meeting of January 14, pharmacist F. Vigier presented specimens of solutions of phosphorus in retinol, and gelatin capsules of the same. The preparations, made at Dr. Barthélemy's request, were still in perfect state of preservation, after a month's keeping. The process for making this solution, a most simple one, is as follows: The retinol is to be first heated to above 100° C. (212° F.), to dissipate all traces of moisture. Next it is introduced into a dry vial and allowed to cool; and, finally, one per cent. of dry, transparent phosphorus is dropped into the liquid. Gentle heating and shaking are all that is necessary to obtain a complete solution. Of course, all containers must, as much as possible, be kept full and always securely stoppered. Phosphorus being thus brought to the Society's notice in connection with retinol, Dr. Constantin Paul took occasion to call once more his fellow-members' attention to the dangers of the substance. "Phosphorus medication," he said, "is always dangerous, as the metalloid is apt to produce most sudden and unexpected effects, announced by no warning symptoms. For quite a while the patient may seem to remain unaffected by the treatment, when, all at once, alarming accidents will occur. It is, therefore, important to ever remain watchful, and it will be prudent to now and then suspend the medication, for a week at least.

At the Society of Dermatology and Syphilography, Dr. Fabret related a case of scarlet rash caused by opium and belladonna pills. The patient took one pill, containing five centigrammes of extract of opium and one centigramme of extract of belladonna. Two hours later he suffered from pruritus and heat, which lasted but a short time. A second pill having been taken, the same troubles reappeared somewhat aggravated, as they were followed by desquamation. At a later period the administration of opium alone brought on the same accidents.

Notes and Queries.

AN EXPERIMENTAL CRITICISM OF OUR KNOWLEDGE OF THE ACTION OF COCAINE.

Dr. U. Mosso (*Pflüger's Archiv*, 1890, Hft. 11 and 12, pp. 553–601) has published an exhaustive paper on cocaine, in which he collates the work of previous investigators, criticises it, and adds a number of experiments made by himself to prove and illustrate his arguments. The paper is too long even to abstract in detail, but his most important conclusions may be given, although many of them are simply confirmatory of previous work. 1. Cocaine in 10 per cent. solution applied to a mixed nerve paralyzes in an equal degree its motor and its sensory strands. 2. Cocaine given internally does not paralyze the terminations of sensory nerves, as curare does of motor nerves. Its action in diminishing general sensibility is chiefly due to an effect on the cells of the spinal cord. It is possible that when cocaine is administered by the stomach or subcutaneously it may diminish to an inappreciable extent the sensitiveness of the sensory end organs, but the amount circulating in the blood is too small to have any pronounced action. Locally applied, a 2 to 10 per cent. solution is necessary for the production of anæsthesia, and this strength can never be applied through the circulation, as it implies the administration of a much more than lethal dose. 3. Direct application of a solution to the medulla causes paralysis of the medullary centres. 4. In dogs doses of ½ milligramme per kilogramme of body weight had no effect on muscular contraction; 1 milligramme acted as a muscular stimulant, and 3 milligrammes acted as a muscular paralyzant. Experiments made on the isolated muscles of frogs and dogs gave similar results. 5. Its general anæsthetic action resembles in many respects that of chloroform or ether. Like them it acts as a protoplasm poison; like them, also, it first affects the psychical functions of the brain, and then sensitiveness to pain, which disappears first in the extremities, then in the trunk, and then in the cornea. 6. After its application the nerves are not injured, and return very speedily to an absolutely normal condition. Mosso also performed a number of exact experiments on himself to investigate the action of cocaine on muscle during its normal condition, during fasting, and during fatigue. These were made on the flexor muscle of the middle finger; muscular contraction was induced either voluntarily or by the interrupted current, and the finger was made to lift a weight of 2 kilogrammes. Tracings were taken in every case and carefully compared. While the author was in a perfectly normal condition he stimulated the muscle seven times per minute for fifteen minutes. He then rested until the muscle had quite recovered from its slight fatigue, and took 1½ grains of cocaine hydrochlorate by the mouth.

On again stimulating the muscle he found that its capacity for doing work was increased. The same dose injected directly into the arm diminished the working power of the muscle. Experiments of the same kind are given to show that the stimulant action is still more marked on muscles which have been tired out by previous work and are in a state of great fatigue. After fasting for forty-two hours he found that the working power of the muscle was very greatly diminished, but cocaine restored it to more than the normal for voluntary contraction, and to very nearly the normal when contraction was induced by electric stimulation. He found also that, after hard physical work with prolonged fasting, small doses of cocaine acted as a speedy restorative, and concludes that, apart from its action on the nervous system, it acts largely as a direct muscle stimulant. He found, also, that it lessened the physiological reaction time, that it increased the amount of air inspired, and that it contracted the blood vessels. For details on these and a number of other points the original paper had better be consulted.—*British Medical Journal*, December 6, 1890.

EHRLICH'S TEST IN TYPHOID FEVER.

It had long been known that when amido derivatives of the hydrocarbons of the benzene series are treated with nitrous acid, compounds are obtained which, owing to their extreme instability, and the readiness with which they enter into combination with an almost infinite number of other bodies, especially with aromatic compounds, have become of great practical as well as theoretical importance.

Particularly interesting is the fact that a very large number of our dyes are derived from these bodies. They were discovered by Peter Griess, and termed by him diazo-compounds.

With the expectation of demonstrating by a color reaction some of the aromatic bodies, the existence of which in the urine had been rendered highly probable by the researches of Baumann and Brieger especially (*Zeitschrift f. Physiol. Chemie*, Bd. 3), Ehrlich undertook a series of carefully-conducted experiments in this direction.

A preliminary account of these investigations was published in the *Zeitschrift f. Klin. Med.*, Bd. 5, in 1882, which was followed by a more complete account of his results in the *Charité Annalen*, 8ter Jahrgang, in 1883.

The practical value of these, especially as regards their diagnostic importance in typhoid fever, has been the subject of much controversy, and it appears at the present day that the so-called Ehrlich's reaction is regarded by many as a medical curiosity of absolutely no diagnostic importance whatsoever; Petri and Penzoldt are the exponents of this side (Penzoldt, *Berl. Klin. Wochenschrift*, 1883, and Petri, *Zeitschrift für Klin. Med.*, 1884). The manner, however, in which these two observers entirely disregard the instructions given by Ehrlich, in order to insure success in the simple experiment, deprives their work of all value, for, as Ehrlich says, "there are but few tests in chemistry which cannot be spoiled by careless manipulation," (Ehrlich, *Deutsche Med. Wochenschrift*, 1883).

A great deal of confusion has also undoubtedly arisen from the fact that the exact color produced in the experiment has either been described improperly, or simply spoken of as the "characteristic reaction," a term conveying no idea whatsoever.

The original work of Ehrlich seems to be but little appreciated, and although we have in previous numbers of the GAZETTE described the application of his test for diagnostic purposes, we do not doubt that the concise directions for applying the test and the confirmatory evidence attained by DR. CHARLES E. SIMON and tabulated in a paper published in the *Johns Hopkins Hospital Bulletin* for November, 1890, will be acceptable to the readers of the GAZETTE.

Since the preparation of the chemically pure, crystalline diazo-compounds is quite a difficult process, Ehrlich made use of the fact that sulphanilic acid, when treated with nitrous acid in a nascent state, forms in solution the diazo-benzene-sulphonic acid, which thus becomes the active principle in the mixture employed.

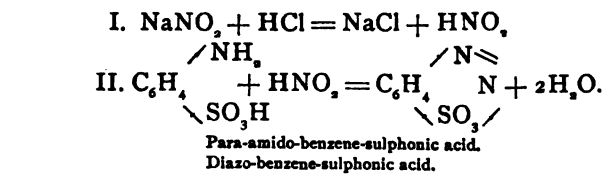
The sulphanilic acid used for this purpose is the para-amido-benzene-sulphonic acid, prepared on a large scale, and used extensively in the coal-tar color industry.

Other compounds, of course, can also be used, as the meta-amido-benzene sulphonic acid, the ortho- and para-toluidine-sulphonic acids, and others, but among all these Ehrlich has found the common sulphanilic acid the most convenient.

Two solutions are employed and kept in separate bottles, the one containing 50 cc. of hydrochloric acid, which is diluted to 1000 cc. and saturated with sulphanilic acid, the other being a ½ per cent. solution of sodium nitrite.

To make the test, 40 cc. of the sulphanilic acid solution are taken in a measuring glass, and 1 cc. of the sodium nitrite solution added, the mixture being thoroughly agitated. The hydrochloric acid now acts upon the sodium nitrite, forming nitrous acid which, in a nascent state, forms the diazo-benzene-sulphonic acid by its action upon the sulphanilic acid. Small quantities of the sodium nitrite are used, and the absence of any free nitrous acid in the mixture is thus insured, and at the same time very small quantities of the diazo-benzene-sulphonic acid are formed,—one of the principal requirements, to insure success in the experiment.

The reaction which thus takes place is represented as follows:


I. NaNO2 + HCl = NaCl + HNO2
II. C6H4 NH2 + HNO2 = C6H4 N + 2H2O.
SO3H
SO3
Para-amido-benzene-sulphonic acid.
Diazo-benzene-sulphonic acid.

In his original article, Ehrlich advised the addition of this mixture to the urine to be tested, in the proportion of 1 : 1 per volume. If ammonia is added in excess to the urine thus treated, the color play, presently to be described, occurs. In a later communication (*Charité Annalen*, Bd. 11, 1886) he has modified this method by mixing one volume of urine with five to six volumes of absolute alcohol, previous to the addition of the sulphanilic acid mixture, filtering, and then adding the acid mixture to the filtrate.

Dr. Simon has found it convenient to add about 50 cc. of absolute alcohol to 10 cc. of urine, filtering and then running into the alcoholic urine, which has become more or less decolorized, the sulphanilic acid mixture from a burette; 20 cc. of the latter are then sufficient, added to about 30 cc. of the alcoholic urine; the addition of the acid in small quantities, for example, 2 cc. at a time, followed by thorough shaking of the urine, is at times advantageous, especially in typhoid fever, when the disease has advanced to a point at which the color reaction is no longer at its original intensity. By the addition of a few drops of ammonia to the final mixture, the characteristic color appears in typhoidal urine to disappear on shaking, and to become permanent after an excess of the ammonia has been added.

The author recommends a small Erlenmeyer's flask as more convenient for holding urine than the ordinary test-tube, the exact shade of color being more apparent by transmitted light. With this modified method most of Dr. Simon's experiments have been performed. There is, however, a third, which is more convenient, less expensive, and more delicate. A few cc. of urine are taken in a small test-tube, and an equal quantity of the sulphanilic acid mixture added, the whole being thoroughly agitated; 1 cc. of ammonia is then allowed to carefully run down the side of the tube, forming a colorless zone above the yellow urine, containing the acid; at the junction of the two a more or less deeply-colored ring will be seen, the color of which is readily distinguished and noted, the slightest carmine tint being made out more readily by its contrast with the colorless zone above, and the yellow below, than when we are dealing with a uniform color.

This simple modification occupies but a few minutes, and will be found especially convenient by the busy practitioner. As to the color-play which occurs in different kinds of urines, it will be observed that normal, or pathological, but non-febrile, urine remains either unaffected or its color is merely intensified by the addition of the ammonia; a deep orange tint may even be produced in this way, but has no significance whatsoever, and is easily enough distinguished from the typical color.

Ehrlich records one exception to this general rule,—that is, urine containing coloring-matters is changed to intense reddish-violet color. Dr. Simon also records another exception, which was that of a case whose urine contained a substance which reduced Fehling's solution but did not reduce the subnitrates of bismuth, and merely produced a black discoloration and in which the fermentation test failed completely. Undoubtedly this was one of the few cases in which glycuronic acid occurred normally in the urine. When Ehrlich's test was applied to this urine a dark-brown color developed, which, at the end of an hour, became almost black. In typhoid fever a color occurs upon the addition of ammonia, which may vary from an eosin to a deep garnet. Here Dr. Simon has found the second and third methods most useful, because with them the faintest rose tint is more readily perceived than when the first method is employed. If the first method be used and there be the slightest doubt as to the presence of the characteristic color which may occur in the latter stages of typhoid fever, a reaction may be said to be present when the foam which appears on shaking shows a reddish color, and especially

when upon standing for twelve to twenty-four hours the superficial layer of the sediment shows a green color.

That this reaction is not dependent upon the presence of any substance normally present in the urine Ehrlich seems to have established beyond a doubt, but as to the nature of the substance producing the reaction we have absolutely no knowledge. It is possible that a careful chemical study of the green sediment will lead to a clue as to the nature of this body, but this, of course, must be left to the hands of chemists.

Ehrlich has tested the urines of patients afflicted with almost every known disease, and has arrived at negative results, with some exceptions, typhoid fever, of course, being the most important and interesting. At times, however, he has met with the same in some of the morbilli, and diseases in general characterized by high fever, as in severe cases of phthisis pulmonalis, although it may occur in the latter in the absence of fever, but when present for some time he regards it a bad omen.

Dr. Simon then publishes notes of twenty-six cases in which this reaction was employed. From sixteen it was absent, while it failed in only four out of twenty-six typhoid fever cases, of which two were children, one a very mild case lasting but eleven days, and one was only tested on the sixteenth day of the disease, a time when the reaction is not always obtained and in fact is usually absent. The author summarizes his conclusions as follows:

1. The reaction may be obtained in cases of typhoid fever from the fifth to the thirteenth day without any difficulty with methods I. and II.

2. With method III. it may be observed as late as the twenty-second day, at a time when neither I. nor II. will yield absolute results.

3. Its absence from the fifth to the ninth day indicates a very mild case, excepting in children, although this rule is probably not an absolute one.

4. As it occurs previous to the appearance of the rash, it is a very useful aid in the diagnosis in typhoid fever.

STYRONE IN OTITIS MEDIA.

Dr. Cheltsoff strongly recommends the employment of a solution of styrone in chronic inflammation of the middle ear. Two forms of styrone exist, both, of course, having the same formula,—$C_9H_{10}O$; one consists of acicular crystals, melting at 33° C., and dissolving readily in ether and alcohol; the other—which is cheaper—is a yellowish liquid with an acrid taste, insoluble in water, but readily soluble in ether and alcohol. It is this latter form that Dr. Cheltsoff has used. He orders a solution of the strength of about a drachm to four ounces of spirit, of which from two to four teaspoonfuls are directed to be mixed with a tumbler of warm water for each syringing; the operation should be repeated two or three times a day. Styrone being both strongly disinfectant and deodorant as well as somewhat analgesic, the secretion soon diminishes and becomes less unpleasant, besides which, the pain, if present, is ameliorated. No irritation is produced as when many other substances are used in sufficiently strong solutions to destroy the micro-organisms present in the secretion.—*Lancet*, November 15, 1890.

COCOA-NUT AS A TÆNICIDE.

The statement published in the Gazette some time ago as to the tænicidal properties of cocoanut have been confirmed by a case reported by Dr. W. R. Allison in the *Peoria Medical Monthly* for November, 1889, in which the milk and meat of the cocoanut was taken by a patient, with the result of the expulsion of an entire tapeworm.

ADDISON'S DISEASE AND THE PARARENAL GLANDS.

Dr. Lancereaux (*Arch. Gén. de Méd.*, January, 1890) relates two cases in which the pararenal glands were the seat of tuberculous disease, the symptoms being weakness of the heart, quick pulse, gastric disturbance, and death by coma. In another case which he has seen, the pararenal glands were intact, while the skin was bronzed. He considers that the diseased condition of these glands in Addison's disease, when it is present, is the result of degeneration of the nerves.—*British Medical Journal*, December 6, 1890.

THE EFFECT OF AGE ON THE ABSORPTION OF DRUGS.

Dr. Yatsuty, having been struck by a remark of Professor Manassein on the influence of age on the rapidity of absorption of drugs, selected this subject for his M.D. thesis, which

has just been published. His experiments were conducted in the Zhitomir Municipal Hospital, of which he is medical officer, and were made on healthy male subjects of from 8 to over 80 years of age, the drugs experimented with being iodide of potassium and salicylate of sodium. The dose was made to depend upon the body-weight, a grain being allowed for each ten kilogrammes. Thus, a boy weighing twenty-five kilogrammes (fifty pounds) was given 2½ grains of iodide of potassium or salicylate of sodium, as the case might be, a man weighing fifty-five kilogrammes being given a 5½-grain dose. The drug was administered in a gelatin capsule, and the urine examined every three minutes in the case of both salts. With the iodide the saliva was also examined every two minutes. This was not done in the case of the salicylate, as in no case was any evidence of salicylic acid detected in the saliva. Dr. Yatsuty gives a tabular view of the experiments, the general result being that the younger the subject the more rapidly had absorption, as evidenced by testing the secretions, occurred. Thus, a boy of 9, weighing twenty-five kilogrammes, taking a dose of 2½ grains of iodide of potassium, generally gave the reaction in the urine in nineteen minutes; a man of 36, weighing sixty-six kilogrammes, and taking a dose of 6½ grains, showed no reaction in the urine until thirty-one minutes had elapsed; and a man of 76, of about the same weight, and taking the same dose, showed no reaction in the urine for thirty-seven minutes. Salicylate was absorbed in boys and young men in about fifteen minutes, while in middle-aged men it required about twenty minutes, and in old men about twenty-five minutes. There were some exceptional cases. Thus, some lads of 18 showed no iodide in the urine until thirty-one minutes; one man of 77 showed it in twenty-eight minutes; so that, although the average rapidity of absorption distinctly diminishes as age advances, it is not possible to say with certainty that a particular individual will absorb one of the drugs mentioned more rapidly than another who is a great deal older.—*Lancet*, January 10, 1891.

THE THERAPEUTIC ACTION OF CHLOROFORM INCORPORATED IN OINTMENT.

Chloroform is mostly employed by physicians in a mixture with oil. In making local application a great portion evaporates. Even when it is applied and protected with rubber cloth or wax paper, haste and care must be exercised if good results are to be accomplished. A precise, limited localization of the anæsthesia cannot be made by this means.

To mix the rapidly-evaporating chloroform with an ointment in a mortar is highly irrational. The greater the quantity of chloroform which is incorporated in an unctuous medium, the thinner and more rapidly disseminating does the ointment become, and the more illusive are localization with prolonged reaction rendered. To anticipate all this, the addition of wax in equal quantity by weight to the chloroform is essential, which should be remembered by the physician when prescribing. The mixture proportion—chloroform, 1 part; cera alba, 1 part; axungia, 3 parts—gives an ointment which gives excellent results in rheumatic local manifestations. Higher proportions—*e.g.*, chloroform, 17 parts; cera, 17 parts; axungia, 2 parts—react more energetically.

These ointments possess the following good properties: They retain the chloroform unchanged for three or four years; they can be spread with facility on old linen, muslin, etc.,—one-eighth of an inch is a layer of proper size,—and they slowly melt at body-heat, liberating the chloroform evenly and successively; lastly, they enable continuous local anæsthesia because of the limited direct application.

The preparation of the ointment is not difficult. The molten fluid, slightly cool mixture of cera and axungia, is poured into a glass jar or bottle, to which a glass stopper has been fitted so as to be perfectly air-tight. To this mixture the chloroform is added and the whole rapidly stirred with a spatula, after which it is allowed to harden. During the cooling process it must be shaken now and again to prevent the formation of unequal layers, tendency to which exists because of the greater specific gravity of the chloroform. —*Pittsburg Medical Review*, January, 1891.

TO REMOVE THE PIGMENTATIONS OF PREGNANCY.

In the *Journal de Médecine de Paris*, January 4, 1891, the following ointment is recommended to be rubbed into the affected parts twice daily to remove the pigmentations which so often disfigure pregnant women:

℞ Cocoa butter,
Castor oil, aa ʒii¼;
Oxide of zinc, gr. v;
Yellow oxide of mercury, gr. ii;
Essence of roses, enough to perfume.

—THE—

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Original Communications.

*SOME OF THE THERAPEUTIC RELATIONS OF THE NERVOUS SYSTEM.**

BY SOLOMON SOLIS-COHEN, M.D.†

THERE is hardly any subject in the whole range of therapeutic study of more importance than the manifold therapeutic relations of the nervous system, and none more difficult. The difficulty lies not only in the complexity of the problems, but in the want of exact data for their solution. I shall not attempt to cover the whole ground, but merely to indicate the bearing of a few familiar phenomena, as an introduction to special and more thorough studies hereafter.

In highly-developed organisms, such as any of the lower mammals, the nervous system is of extreme importance, on account of its functions in governing the processes of organic life and in regulating the exercise of the functions of animal life. Man, in addition to these, has the exquisitely-developed nervous mechanism of the mind, whose states react in so intricate a manner upon bodily conditions. In order to facilitate our present studies, it will be necessary to entirely ignore the psychical factor; but even so, we have still

* Delivered in the Philadelphia Polyclinic Evening Lecture Course, February 24, 1891.

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a complex mechanism, with far-reaching and insufficiently understood relations, to deal with.

In the protozoa, the undifferentiated protoplasm possesses not only *irritability*, or the power of response to stimulus, but also the power of originating action, or *automatism*. As we proceed higher in the scale of development, while irritability is retained by all the cells of the body, automatism becomes more and more restricted, until at last it is almost exclusively lodged in the specialized tissue which we call nervous matter. The other cells normally act only in response to stimulus of nervous origin, which thus becomes the governing power. When, however, in the normal exercise of reproductive function, the ovum, a cell devoid of specialization, is produced, it contains within itself all the potentialities which, having been *e*volved, must have been *in*volved in the primordial *soon*. Most fundamental of these is the nutritive-automatism. This fact is of importance in studying the processes of inflammation, repair, and neoplasm-building.

The simplest nervous mechanism consists of three parts,—a, nerve-cell or ganglion, which receives impressions from without, and transmutes them into impulses of action; an afferent nerve-fibre, which conveys these external impressions *to* the ganglion, and an efferent nerve-fibre, which transmits, *from* the ganglion, the impulse, which, on arriving at the peripheral organ, results in action. A nerve-cell of this description may, however, be itself under the control of other nerve-cells, which have the power of preventing or inhibiting its action, or of neutralizing the result of that action; and these inhibitory cells may themselves be under like dominion. Thus, for example, we have the well-known phenomena of reflex action of spinal nerve-cells, as exhibited in the knee-jerk, which, however, is capable of being prevented by the exercise of the will through the cerebral motor mechanism. So, too, in functions which are wholly involuntary, similar phenomena are manifested. Take, for example, the nervous mechanism of heat and temperature reaction, which play so important a part in the maintenance of the life of warm-blooded animals, and which, when disordered by disease, give rise to the phenomena of fever. Heat is produced in the body as the result of certain of the necessary functions of life; and, also, it is highly probable, for the special purpose of maintaining temperature, by oxidation of a certain (*thermogen* of MacAllister) portion of muscular substance. Some of this heat is, through the agency of the nervous system, converted into work, and has no effect upon the temperature of the body. Some is dissipated by radiation from the skin, and in the secretions and excretions, especially in the expired air. When neither converted into work nor dissipated, however, the heat necessarily raises the body temperature, and this temperature would thus be subject to enormous variations on account of the varying demands of the different organs for work and of the varying nature of the voluntary activities, were it not for a special mechanism which regulates temperature. This regulation is accomplished in two ways,—by diminishing the production of heat and by increasing heat dissipation. The regulatory mechanism may, therefore, be looked upon as bearing the same relation to the lower nervous mechanisms, which preside over heat-production or heat-loss, as the brain to the spinal cord. Using the word centre in a broad sense, we then have a *thermogenetic* or heat-producing centre, which stimulates all those processes producing heat, and especially the oxidation of thermogen; a *thermolytic* or heat-dissipating centre, which stimulates respiration, the vaso-dilators, and other mechanisms of heat loss; and a *thermotaxic* or heat-regulating centre, which preserves a proper *balance* between these two. The functions of the thermotaxic centre are probably inhibitory in large degree.

Fever heat being one of the most ordinary manifestations of all forms of disease, it is important that its relations with the nervous system be understood, as far as ascertained facts will permit, so that we can correctly apply therapeutic measures to its treatment.

Hughlings Jackson has shown that the order of dissolution in any nervous mechanism is inverse to the order of evolution. In other words, that which is of latest organization yields first; the pyramid topples at its apex before the base is shaken. The latest organized of the nervous mechanisms of heat is evidently the taxic mechanism. This, as Hale White more especially insists upon, is seen not only by observing its entire absence in cold-blooded animals, its less perfect development in the lower forms of mammals, but also by observations upon infants, whose temperature, it is well known, is subject to great variations from external causes, from internal vegetative processes, and from the emotions. For this reason, too, high temperature in an infant or a child is of less

pathological importance than in an adult. Whether heat-production be increased or diminished, in the normal state of affairs temperature is not apt to vary, save within certain well-defined limits, for the reason that the thermotaxic mechanism causes heat-loss to vary in a complementary manner. When, however, the poison of scarlatina, for example, circulating in the blood, comes in contact with the nerve-cells composing the thermotaxic centre, it interferes with their proper performance of function, and the relation between heat-production and heat loss is *unbalanced*. Balance of function consitutes health; unbalancing is an evidence of disease.

How far, however, the phenomena of fever heat are salutary, tending to preserve the organism and destroy the poison, and how far they are in themselves deleterious, is as yet an unsettled question. I am of those who regard moderate fever-heat as beneficial, both in the light of clinical experience and upon the broad application of biologic doctrines. Its organization in the race as a part of the reaction against toxic agents, is, to my mind, *a priori*, proof of its usefulness. To this subject we will recur in another connection.

Take, again, the case of the circulation. This is regulated by a very complicated nervous apparatus, central and peripheral, with intercorrelating fibres. Undoubtedly the heart-muscle possesses to a certain extent the power of automatic contraction of unstriped muscular fibre, and this power is greatest perhaps in the auricles. But more important is the nervous mechanism. This consists of a peripheral motor apparatus, which, being stimulated by the presence of blood, causes contraction of the muscles; a central apparatus of motion, which also causes contraction under various appropriate stimuli; and a central and perhaps also peripheral apparatus of nutrition, which controls or inhibits the action of the motor ganglia. Further, the activities of the heart must be correlated in a very intimate manner with the activities of the blood-vessels, with the activities of the lungs, with the activities of the digestive and excretory organs, thus requiring an elaborate apparatus of communication or correlation, all of which is furnished by the nervous system; and so in regard to all other functions or organs. The nervous system excites, restrains, controls, and co-ordinates their action.

Thus it is that disease in one organ or tissue is capable of causing an infinite variety of perturbations in organs at a distance. The further removed it is from the periphery, the greater the number of communicating fibres affected by disorder in the nervous system, and therefore the wider the distribution of secondary disturbances; but disturbance at the periphery may, by so-called reflex disturbance of a centre, simulate central disturbance in degree and area of secondary effects.

While thus the intimate connection and wide distribution of nervous tissues render intricate and confusing the phenomena of disease and of recovery, they also help us, by directing our therapy against some central disturbance, to antagonize a number of morbid phenomena with a single remedy.

The points which we have to consider specially in directing our attention to the therapeutic activities of the nerves are, first, *nutrition;* and, secondly, *special function of tissue innervated*. Most of what I have time to say will be confined to the first of these themes.

The body being a congeries of cells, grouped into organs, each cell having, in addition to sustentation of its own life, a certain function to discharge in the economy of the whole, the nutrition of the body depends first upon the nutrition of the cells; while the nutrition of each cell depends upon its being furnished with proper materials therefor through the functional activity of some other cell. Therefore, not only must the nutrition of each cell be provided for, but it must be kept functionally active, in order that it may do its share towards the nourishment of the others. In truth, nutrition ought to be a broad enough term to include not only assimilation (upbuilding of tissue, or *anabolism*), but also the *dis*assimilation (breaking-down of tissue, or *catabolism*, with expulsion of *débris*, or *excretion*), which is a necessary concomitant of the exercise of function. We may, therefore, consider either that every cell is supplied through the nervous system with two sets of impulses, —anabolic or nutritive and catabolic or functional,—or that the anabolic phase of nutritive power remains with it as an inheritance from the primordial automatism, while the catabolic phase, being coextensive with function, has passed under nervous control. I know of no experiments which are conclusive as to this point. From clinical observation, I should say that in all probability the potentiality of anabolic automatism remains with cells, but that when normal relations prevail, the process is actually under nervous control.

The health of the body as a whole depends

upon the proper *quantitative* performance of both sets of activities. But the health of the cell itself depends upon maintenance of the proper rhythm between them, which, in this sense, may be called *qualitative* performance. Undue preponderance of either means disturbance, and disturbance in one part is necessarily the cause of disturbance, greater or less, in all other parts.

The first point to be determined, then, whether in relation to disorder of the whole system or to disease of a particular part, is in which direction the balance of function has been disturbed; whether there is undue preponderance of cell nutrition, building up the individual at the expense of the society, or whether there is undue preponderance of functional activity, breaking down the individual, and in this case, as in all others, with loss rather than gain to the society.

In most acute febrile disorders we find the latter to be the case; in most inflammatory conditions, the former is the case, with certain modifications to be pointed out; and in a great many cases the phenomena are so involved that, in the present state of knowledge, we cannot pronounce positively. One process may predominate in one part of the organism, the other, in other parts; as, for example, in tumors associated with cachexia and wasting, or in inflammations associated with fever.

We have already seen that in fever the thermotaxic mechanism is in disorder, in most instances probably as the result of a toxic agent circulating in the blood. The control, inhibition, or *anabolic* function is thus diminished; and the thermogenetic mechanism, being unrestrained, produces increased oxidation of thermogen,—that is, *hypercatabolism*. The result is the wasting of tissues, so commonly observed. The tendency to the production of bed-sores upon very slight mechanical pressure is another evidence of this condition.

Graves appreciated these facts from a clinical stand-point, when "he fed fevers;" though there are other circumstances, too, governing the feeding of fevers, beyond the scope of our present study.

What indication for treatment can we derive from this method of viewing pyrexia? First, we must consider more attentively a matter briefly alluded to a short time ago. It is important that disease and recovery should be looked upon as parts of one continuous process.

The distinguishing characteristic of living things is their ability so to adjust themselves to changes in their environment, or so to adjust some of their parts to changes in other parts, that the general equilibrium may be maintained. This process of adjustment is continuous in every living thing. Just as the balanced action of centripetal and centrifugal forces serves to keep the planets in their orbits, so the balanced action of destructive and constructive forces serves to maintain the even tenor of life and health. Let either predominate, and we have that disturbance, that *unbalanced condition*, called disease; for hypertrophy (overgrowth,—*i.e.*, *excess of construction, hyperanabolism*) is as much a disease as hypotrophy (want of growth) or atrophy (wasting,—*i.e.*, *excess of destruction, hypercatabolism*).

But the inherent tendency of life, confirmed and organized throughout all the ages of evolution, is to restore the disturbed balance of forces. So soon, then, as, from whatever cause, the *balance of function* we call health is disturbed, and the *unbalanced condition* we call disease is originated, the *inherent tendency to restoration* (*vis medicatrix naturæ*) is called into action, *compensatory disturbance* is set up, and its phenomena become commingled with the phenomena of disease.

To learn to separate in his observation the disturbances of disease from the disturbances of recovery is the most important, as it is the most difficult, task of the student of the art of healing. Its accomplishment in many cases is impossible for want of exact knowledge. Still, we may do much towards improving our knowledge by a careful study of the part taken by the nervous system in the production of these phenomena.

It is a doctrine at least as old as Hippocrates that fever is a conservative process. In its most modern form this doctrine represents the high temperature as destructive to micro-organisms. It is also a well-known fact that heat affects the action of certain drugs, and various experiments have recently been undertaken to show that a moderate fever-heat lessens the toxic effects of the chemical poisons produced in the body by pathogenic microbes; but the evidence is, as yet, too uncertain to lay much stress upon.

Much, however, seems to be beyond reasonable doubt.

Heat applied externally is one of the most valuable therapeutic agents in bringing about resolution of non-suppurative localized inflammation, as cellulitis of an extremity, peritonitis, pleuritis, and pneumonitis at certain stages.

Heat externally, and by means of hot

drinks, to promote diaphoresis and "bring out the eruption," is often resorted to in sluggish cases of measles and other exanthemata, and, upon success of the measure, alarming symptoms disappear.

Heat externally and hot drinks had often to be applied by me in the recent epidemic of influenza, because of a coldness and want of circulation, associated with a tendency to collapse; and prolonged subnormal temperature was a marked feature in this class of cases. In one case it was the only objective sign of disease detected.

In cases of threatened collapse in various affections with which we have had experience, and in cholera, with which I fortunately have had no personal experience, we all know or have read of the great value of heat.

On the other hand, experiments have conclusively shown that greater temperatures than any commonly met with in fevers can be borne by animals for long periods, and that many of the evil results attributed to this heat by former observers cannot be confirmed. Clinical experience, too, multiplies the number of patients known to recover from high temperatures and the number of deaths attributed to the depressing effects of heroic doses of antipyretic drugs. These two lines of observation are further coincident with what might reasonably be deduced from the doctrine of natural selection; that the organization of pyrexial tendencies in the race is an evidence of their protective power.

We need, therefore, not hesitate to affirm, even upon this incomplete presentation of evidence, that the pyrexia of fever is, when within limits, an evidence of the tendency to recovery, and is not to be too hastily interfered with.*

The reaction of the organism against the attacks of disease is not always confined, however, within the limits necessary to restore equilibrium. If it were, the physician, like Othello, would find his "occupation gone." Whether from greater instability of organization in certain persons, so that dissolutional processes cannot be brought again under control by the inherent forces of the organism, or from whatever reason, we do at times find symptoms indicative of dangers arising from *hyper*pyrexia. I do not think, however, that we can define the limit between salutary pyrexia and dangerous hyperpyrexia by a line on the thermometer. We must be guided by the association of symptoms, and it is very possible that some of these untoward symptoms may be due to the poison of the disease and not to the heat.

They are those, in general, of profound nervous disturbance,—feebleness and irregularity of the action of the heart, dyspnœa and irregular respiration, insomnia or somnolence, delirium or coma vigil, arrest of secretions, and the like.

They indicate loss of control by higher centres, unrestrained, inco-ordinate action of lower centres and of peripheral mechanisms,—complicated as well by loss of functions in parts unsupplied, or supplied imperfectly or perversely, with blood or with the materials upon which to perform function.

These symptoms demand therapeutic intervention, and it is a fact that, in typhoid fever, for example, where they are often most marked, they may be made to disappear by a measure which also reduces temperature; but—and this is the important point of practice—that measure is not one which directly depresses the nervous apparatus of heat production.

We have seen that high temperature is not an index of increased heat production simply, but of an increase of heat production *relatively* to heat loss. This is an evidence that the thermotaxic centre has been overthrown, or that the ordinary thermotaxic mechanism is inadequate. We, therefore, turn our attention directly to the lower centres. We can reduce temperature by depressing the thermogenetic centre or mechanism, or by stimulating the thermolytic centre or mechanism, or by artificial thermolysis,—namely, abstraction of heat,—the ends aimed at in the two former methods being accomplished by the use of drugs, the latter being carried out by cold bathing, sponging, ice packing, and the like.

We have drugs, such as antipyrin and its congeners, which exercise a powerful effect in reducing temperature, by depressing thermogenesis. If, however, we study closely the effects of these drugs, we find that not only is the reduction of temperature transient, but that it is often accompanied by depression of

* In an "analysis of one thousand cases of acute lobar pneumonia treated at the London Hospital between the years 1880 and 1890," Fenwick (*Brit. Med. Journ.*, January 31, 1891) found that those cases presenting an average temperature of about 103° F. were attended with *the minimum of mortality*, "the states of hyperpyrexia and apyrexia corresponding to the maximum of danger to life." It appears, further, that thirty-five per cent. of all the deaths coincided in time with the sudden defervescence in temperature, the only period more fatal than this being that of the height of the fever. In other words, it is extremes only that are to be dreaded.

other functions which are necessary to the preservation of life,—cardiac and respiratory action, disassimilation, tissue respiration, secretion, and excretion. The action of the poison, then, is not confined to the heat-producing centre, but affects nervous centres of organic life in general; and it is, therefore, to be avoided, as a means of reducing temperature simply, save in extreme cases and with great caution, for temporary purposes. We have as yet no safe drug with which to depress thermogenesis without the risk of affecting other functions injuriously. This method must, therefore, be set aside.*

Thermolysis may be stimulated by opium in appropriate doses (when this drug is not otherwise counterindicated), nitrous ether, the saline diureto-diaphoretics, and other agents acting upon the lungs, kidneys, skin, and vessels. The amount of reduction of temperature which can be thus effected is not marked, and in all but mild cases such measures have only auxiliary utility.

The method of artificial thermolysis, or abstraction of heat by cold sponging, cold bathing, etc., has in its favor clinical experience, and on theoretical grounds can be best defended. It is very probable, too, that the cold acts upon thermogenesis peripherally,—that is, it checks the oxidation of muscular substance without reference to the nervous impulses, and thus opposes hypercatabolism without depressing general vital functions. It acts also reflexly to allay the central nervous disturbance, and thus tends to restrain abnormal central action without undue depression of normal function as well. In brief, the thermotaxic centre having been deranged and unable to co-ordinate heat-loss with heat-production, the therapeutist steps in to supply the deficiency. He increases the dissipation of heat, with as little disturbance of other functions as possible, and without interfering with that normal reaction of the organism which is so potent a factor in recovery.

In inflammations, we have said, the processes of anabolism are unduly increased. So far as the cells participating in the inflammation are concerned this is undoubtedly true; it is not true as to the organs, for these suffer in nutrition just in proportion as the nutrition of the cells is unduly increased. It is a condition of dissolution of society, the individual flourishing at the expense of the whole. Further, as organs are made up of various tissues, the higher and more specialized tissues are crowded out and destroyed by the abnormal growth of the lower and less specialized tissues; just as in revolution and riot—even justifiable revolution—the higher orders of citizens suffer the most. Thus, with undue preponderance of cell nutrition, cell function is lost, and the whole organism, therefore, suffers a deprivation of nutritive materials.

How is the abnormal cell nutrition of inflammation manifested? By reproduction. Inflammation produces a reversion of organized structures to aggregations of undifferentiated embryonic cells. As the process continues, the new cells may finally be deprived of nutrition by mechanically cutting off their own blood-supply, and in other ways; and may thus perish, be absorbed, and resolution occur. This is the normal restoration of balance of function. Or they may fall victims to pyogenic organisms, and suppuration take place. This may aid recovery or introduce new dangers, according to the location of the abscess and other points we cannot now consider. It is also to be noted that the *new cells* of (morbid) inflammatory tissue are no longer under nervous control; they are automatic in their nutrition and incoordinate in their activity; and, although derived from the organism containing and sustaining them, are in reality parasites. They are rioters, who, having become anarchists, are public enemies. But the essential characteristic, from our present point of view, is the abnormal nutrition of individual cells. All other phenomena are secondary to this.

The phenomena of inflammation, then, *in so far as they pass the limits of normal reaction*, have occurred in response to an abnormal impulse, which, whatever may be its detailed mechanism, is, in relation to the cells stimulated or let loose from control, of an anabolic nature. If, now, the therapeutist can divert or neutralize the nervous impulse of supernutrition, reproduction does not take place,

* Quinine and salicylic acid, with their congeners, often reduce temperature safely, but more probably by destroying the disease poison, as specifics in certain diseases, and we must, therefore, exclude them from present consideration. In massive doses and in general cases, as antipyretics simply, they, too, are to be avoided. Phenacetin, acetanilide, and others of the newer drugs are not so dangerous as antipyrin, and all have their legitimate uses; but we are here dealing with broad principles only, not specific details. The dangers attending their use should never be forgotten, as we never forget the dangers attending the use of opium and arsenic. But there seems to be a tendency to use these new poisons of the laboratory empirically, with insufficient indication and without adequate caution.

and inflammatory tissue is not formed. Here we have a possible explanation of a part of the action of opium in controlling inflammations. Opium intercepts the diseased impulse, whether upon its way to the centre or in its transmutation at the centre, and thus averts the abnormal stimulation of, or the abnormal loss of control over, the anabolic processes. In all probability the reason why codeine has a special advantage over all other of the derivatives of opium in this application is because it most possesses this power. As yet we do not know why it is that drugs should act in this manner or in the other, but if it should be found, as Brunton has suggested, and as seems plausible, that the phenomena of pharmacology are phenomena of wave interference, we should explain this action of codeine by the size or rate of its wave movement.

To show another application of the doctrine here presented for your reflection, let us take an illustration in which we have a deficiency of anabolic impulse, the so-called condition of neurasthenia. These cases are characterized by the absence of definite organic disease, yet there is wasting of tissue and inability for exertion, a vicious circle acting and reacting to keep up both phases of the disorder. Feeding, improving digestion merely, will not suffice. We administer strychnine, a catabolic agent, whose power is, by stimulating organic processes, to promote the breaking down of tissue. We administer oxygen, the great consumer, the *Loge* of science, and arsenic, an agent which probably destroys tissue; and yet, although we have given agents, the action of which is to increase the breaking down of tissue, the net result is that the patient increases in nutrition. The reason is obvious. Health depends upon a proper balance between cell-nutrition and cell-function. The impulse of nutrition is called forth by the exercise of function, and function is again rendered possible by the rebuilding effected. But, unless function goes on, nutrition cannot take place. Living tissues are not like inanimate matter, capable of indefinite continuance in quiescence. Life is normal life only when both its phases rhythmically alternate. In neurasthenia this is not the case. Its starting-point may have been indigestion, lessening nerve-nutrition; or too great nervous exertion, leading to exhaustion; or a combination of causes may have been at work. Impaired nutrition lessens capacity for function. Lessened function reduces nutrition. There is a vicious circle, and we must choose some one point at which to break it. When, by our therapeutic measures, we have restored the functional activities of the cells, we have restored that condition of the cells which sends to the equilibriating or taxic centre the needed impulse of upbuilding, and in response to that restored normal stimulus we have a restoration of proper nutritive activity.

These are but a few sketchy and imperfect illustrations of the influence of the nervous system in and over disease and recovery.

The subject cannot be thoroughly elucidated in anything short of an elaborate treatise. But the little we have seen may induce us to pay more conscious attention to this phase of the therapeutic science, and, as physiology and pathology give us increased and more exact information, to seize upon that information, and use it in the service of the art of healing.

HEAT PHENOMENA IN CURARIZED ANIMALS.

By Edward T. Reichert, M.D.,* Philadelphia, Pa.

Part I.

THE extraordinary ability of curare to abolish completely the movements of the voluntary muscles without, as a rule, seriously affecting the other important functions renders it of inestimable value in the study of phenomena which demand absolute muscular quiet; and, next to anæsthetics and analgesics, there is perhaps no agent more valuable in the laboratory. Notwithstanding its recognized value and almost universal employment by vivisectors, our knowledge of most of its important physiological actions is largely of a very general nature and far from being satisfactory.

A somewhat extensive series of researches on the heat mechanism in animals, which has been in progress for some years in our laboratories, has necessitated the employment of curare. The absence of sufficient knowledge of the actions of this substance on the heat functions has demanded its study. Since in this work it only has been necessary to use quantities just sufficient to abolish voluntary motion, the experiments have not extended beyond the employment of small doses. Indeed, further than this has not been needful, because the actions of large

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doses are sufficiently understood. The results of this investigation have been of exceptional physiological interest, and in some respects surprising; and while they were intended to serve solely as a basis of certain of our experiments, they are of such immediate value to those engaged in the study of the heat mechanism, or of the actions of various agents upon it, that it has been thought advisable to put them on record in advance even of the fundamental part of the research.

size, after doses of ½ centimetre of a two per cent. solution of curare, observed a diminution of temperature of from .10° to 1° C., which progressed gradually to the onset of convulsions, when it rose to a slight extent (.1°), or continued to sink. The rise he thought was due to an increase in heat production in the muscles, and not to the con vulsive movements. Fleischer (*Pflüger's Archiv für Physiologie*, 1869, ii. s. 441), in seven experiments on rabbits and dogs, with

Number of experiment.	Dose.	Animal.	Time after injection of maximum rise.	Amount of rise.	Death.
1	.005	Rabbit.	16 minutes.	1.4°	In 36 minutes.
2	.002	Rabbit.	16 minutes.	0.9°	Non-fatal.
3	.002	Rabbit.	14 minutes.	0.8°	Non-fatal.
4	.001	Rabbit.	16 minutes.	0.2°	Non-fatal.
5	.003	Rabbit.	18 minutes.	0.2°	Non-fatal.
6	.00075	Rabbit.	21 minutes.	0.6°	Non-fatal.
7	.00125	Dog.	4 minutes.	0.4°	In 33 minutes.

The large amount of heat evolved from muscles as a result of their activity naturally leads to the inference that when these organs are apparently completely paralyzed, as in curarized animals, the formation of heat in them would to a great extent cease, and, as a natural result, there would be a tendency to a diminution of bodily temperature. Coupled with this we have the fact that even small doses of curare dilate the cutaneous capillaries, and thus indirectly increase heat dissipation, thus lowering temperature. The prevalent belief that curare always lowers bodily temperature, therefore, seems based on good theoretical grounds, and there are experimental records which are corroborative. The latter, however, are far from being entirely satisfactory, owing to their limited number, the brief periods of observation, the conflicting results, and the absence of sufficient investigation in the matter of dosage.

Claude Bernard, in observations on rabbits, sometimes noticed a rise of temperature, at others a fall; the rise he attributed to an increased excitability of the sensory nerves. Tscheschichin (*Du-Bois Reymond's Archiv f. Physiologie*, 1866, s. 151), in rabbits of medium lethal and non-lethal doses, always noted a primary rise, which was followed by a decrease to the normal, or even below it. He is of the opinion that convulsive movements have nothing to do with the increase. The main features of these experiments are condensed in the above table:

In Experiments 6 and 7 curarine sulphate was used.

Hogyes (*Archiv für Exp. Path. u. Phar.*, xiv. s. 138) found in one of two experiments on rabbits, after injecting .001 gramme under the skin, a fall of 1.32° C.; and in the other, after a dose of .002 gramme, a preliminary rise of .44° C., which was followed by a fall. Death occurred in the first in one hour and thirty minutes, and in the second in twenty-six minutes. Riegel (*Centralblatt f. Med. Wiss.*, 1871, s. 403) noted a fall which he believed was due to diminished metabolism. Claus (*Hoffmann and Schwalbe's Jahresberichte*, Bd. i., 1872, s. 599) also records a diminution. Falck (*Pflüger's Archiv für Physiologie*, Bd. xxv. s. 565) states that in four experiments out of five on dogs, in which sublethal doses were used, a primary rise occurred. The following tabular statement is of interest:

Number of experiment.	Time of death.	Temperature. Difference between			Time of occurrence of highest temperature.
		Beginning and end.	Highest and lowest.	Beginning and highest.	
1	15 minutes.	—0.6°	0.8°	+0.2°	7 minutes.
2	19 minutes.	—1.1°	1.4°	+0.3°	7 minutes.
3	25 minutes.	—1.0°	1.3°	±0.0°	.0 minutes.
4	28 minutes.	—1.5°	1.6°	+0.1°	15 minutes.
5	29 minutes.	—1.0°	1.1°	+0.1°	4 minutes.

Mosso (*Virchow's Archiv*, Bd. 106, s. 80) also has noted an early increase. Voisin and Liouville (*Centralblatt f. Med. Wiss.*, 1867, s. 414) state that the therapeutic employment of curare in man caused fever, the axillary temperature being increased from 1° to 2° C., the febrile condition lasting for many hours, and gradually diminishing. Kemp (THERAPEUTIC GAZETTE, March 15, 1889), in some careful studies, by far the most valuable on record, obtained results which varied with the dose. He found that small doses caused an immediate rise in rectal temperature, the extent and duration of which depended upon the dose and temperature of the surroundings. Large doses caused a transient rise, followed by a steady fall, the rapidity of which was owing somewhat to the dose, but especially to the temperature of the surroundings. A rise of temperature always occurred, he states, and in some of his experiments remained hypernormal for hours, and even after the recovery of voluntary motion. The doses which he employed varied from .24 to 4.55 milligrammes to the pound of body-weight, and were usually given by the vein. He, moreover, is the only one who has attempted to study by the direct method the actions on the processes of heat production and heat dissipation. These results will shortly be referred to.

While the conflicting statements of these investigators are explained in part by differences in dosage, variations in the temperature of the surroundings, the uncertain composition of the curare, and other less important circumstances, it seems as though there was much not as yet understood.

For reasons already stated I was led first to make a number of experiments on the actions on the bodily temperature, and finally to ascertain more definitely the alterations which are caused in the heat mechanism. This research, therefore, comprises two classes of experiments,—one on the changes in bodily temperature, and the other on the alterations in the processes concerned in heat production and heat dissipation. In all of these dogs were used. The curare was from an original package, as put up by the Indians of South America, and was presented to me by Dr. S. Weir Mitchell, who obtained it through the Smithsonian Institution.

FIRST SERIES.—*The Effects on Temperature.*—In this series the dogs were tied in the conventional trough, lightly etherized, a tracheal tube inserted, the external jugular vein exposed, and the effects of the anæsthetic allowed to pass off. A thermometer was then inserted into the rectum, and, after the mercury had ceased to rise, a record was made, and a quantity of a two per cent. filtered solution of curare was injected into the external jugular vein drop by drop at intervals of a few seconds until the characteristic influences on the muscles became apparent. Artificial respiration was then begun and maintained, and in the course of a few moments complete paralysis of voluntary motion supervened. The quantity of the solution ordinarily required varied from ½ to 1 cubic centimetre, this being sufficient to maintain complete muscular quiet for an hour to an hour and a half, or longer. As soon as the appearance of twitchings indicated the return of voluntary motion, a small quantity was again injected, and this repeated as often as necessary. In several experiments, however, the doses were given more frequently, and in much larger quantities, than absolutely required to arrest voluntary motion, but in these instances with special objects in view, as will be made apparent.

After the thermometer was once inserted it was kept continually in place during the entire periods of observation, which lasted from three-quarters of an hour to seven hours, records being made generally at intervals of fifteen minutes. Nineteen experiments were thus performed on normal animals, the records of which will be found condensed in the table given below.

A study of these records will elicit many interesting facts, but a want of space will prevent more than a general examination. It is at once noticeable that a preliminary rise of temperature has not invariably occurred, as was found by Kemp. In only seven out of nineteen experiments did the temperature at any time go above the normal standard, and in the other twelve a more or less marked diminution was noted.

In Experiment 1 the temperature fell .55° during the first hour and a half, and then showed a slight tendency upward. A second injection had no immediate effect, but at the termination of the next hour there was a gain of .2°, and the temperature continued rising notwithstanding repeated injections. The normal was regained at the end of four and a half hours, and at the end of six and a quarter hours the temperature was .6° in excess. In Experiment 2 there was a decrease of .5 during the first fifteen minutes. This was followed by a slight rise, the temperature remaining at about the same point above nor

Time.	Exp. 1.	Exp. 2.	Exp. 3.	Exp. 4.	Exp. 5.	Exp. 6.	Exp. 7.	Exp. 8.	Exp. 9.	Exp. 10.	Exp. 11.	Exp. 12.	Exp. 13.	Exp. 14.	Exp. 15.	Exp. 16.	Exp. 17.	Exp. 18.	Exp. 19.
hrs. min.	14 kilos.	14 kilos.	24 kilos.	26 kilos.	12 kilos.	7 kilos.	27 kilos.	17 kilos.	6.5 kilos.	5 kilos.	5.5 kilos.	5.3 kilos.	14 kilos.	24 kilos.	9 kilos.	22.5 kilos.	12 kilos.	27 kilos.	11 kilos.
.00	39.15	40.55	40.90	38.50	38.55	39.00	40.30	39.80	39.20	39.05	38.90	39.40	39.00	39.00	39.55	38.60	39.00	39.55	38.70
.15	38.90	.50	41.00	.75	.53	.—	.25*	.55	38.80	38.90	.45	38.85	38.95	38.85	.50	.30	38.35	.42	.70
.30	.65	.60	.05	.80†	.55	.—	.30	.50	.65*	.88	.20	.40	.75	.72	.42	.12	.00	.44	.50
.45	.68	.60	.05	.83	.55	.—	.42	.50	.51	.85	.18	.32	.63	.70	.41	.09	.87	.46	.22
1.00	.70	.65	.10*	.87	.56	.10	.52	.40	.37	.88	.10	.25	.55	.62	.43	37.70	37.70	.45	.10
.15	.70	.70	.10	.95	.55*	.—	.50	.35	.25	.78	37.85	.15	.45	.60	.44	.55*	.37	.37*	37.92
.30	.60	.72	.10	39.07	.55	.17	.53	.40	.15	.60	.80*	.15*	.15	.65	.45*	.60	.22	.37	.75
.45	.65	.67	.20	.25†	.80	.—	.55*	.45	.05	.55	.80	.25	.15	.62	.37	.55	.15	.32	.70
2.00	.65*	.72	.30	.35	.85	.24	.55	.40	37.95*	.60	.80	.35	.20	.65	.37*	.40	.00	.27	.73
.15	.65	.72	.40	.65†	.90	.30*	.57†	.32	.85	.70	.92	.40	.25	.75	.32	.40*	36.95*	.20	.72
.30	.85	.72*	.42*	.90†	.83	.—	.50†	.30	.80	.57	38.10	.50	.35	.75*	.32*	.45*	37.02	.15	.76
.45	.90	.75	.50	40.17†	.80*	38.96	.42†	.20	.75	.60	.15	.50	.40	.70	.27	.47	.02	.10*	.75‡
3.00	.95	.90	.50	.45†	.95	.—	.35†	.25	.90	.—	.25	.60	.42*	.72	.20	.57	.10	.05	.45
.15	.80	41.12	.60	.60	.92	.—	.35	.25	.—	.65	.25*	.60	.45	.72	.15	.60*	.22	.00	.75
.30	.87	.30	.80	.96†	.90	.80	.30†	.35*	38.00	.60	.20	.70	.55	.—	.10*	.55	.40*	38.92	.95
.45	.95	.40	.85	41.23‡	.....	.—	.15†	.55	.—	.—	.22	.—	.65	.90*	.05	.55	.55	.90*	.80
4.00	39.00*	.60	42.05	.—	.....	.75	.15	.50	.—	.80	.27	.70*	.75*	.—	.—	.65	.67	.89	.75
.15	38.90	.75	.25	.60‡	.....	.....	39.95†	.40	.—	.....	.50*	.85	.70	.75	39.00	.75*	.75	.85	.55
.30	39.10	.90	.40	.80	.....	.....	.80	.35*	.35	.....	.70	.90	.75	.60	38.92	.80	.95	.85	.55
.45	.30	42.00*	.65	42.05	.....	.....	.80	.35	.—	.....	.—	.—	.60	.58	.90*	.90	.90	.90	.55†
5.00	.28*	.20	.83	.32	.....	.....	.78‡	.30	.—	.....	.70	39.10	.73	.45*	.89	.90*	38.15*	.91*	.70
.15	.20	.45	43.20*	.40‡	.....	.....	.65‡	.30	.—	.....	.—	.—	.78	.32	.85	.90	.15	.99	.70
.30	.50	.52	.62	.60‖	.....	.....	.55‡	.30	.—	.....	.80	.20	.80	.40	.85	.92	.15	39.07	.85
.45	.67	.60	44.05	43.00	.....	.....	.45	.30	.—	.....	.—	.—	.75	.35	.90	38.00	.30	.10	.93†
6.00	.68	.78	.35	.30‖	.....	.....	.45‖	.30	.50	.....	.90	.25	.70	.....	.91*	37.90	.32	.17	.87†
.15	.70	43.20	.35	.25	.....	.....	.50	.25	.....	.....	.50	.—	.75	.....	.99	.90	.47*	.18	.87
.30	.....	.50	.45	.20	.....	.....	.....	.....	.....	.....	.....	.25	.....	.....	39.07	.....	.42*	.20	.87‡
.45	.....	.75	.35	.—	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.85
7.00	.....	.80	*d.*	.—	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.83
Gain or loss.	+ 0.55	+ 3.25	+ 3.55	+ 4.80	+ 0.35	— 0.25	— 0.85	— 0.60	— 1.45	— 0.50	— 1.10	— 1.25	— 0.85	— 0.68	— 0.70	— 1.20	— 2.05	— 0.70	— 1.15

* Injected intravenously .007 gramme of curare.
† Injected intravenously .014 gramme of curare.
‡ Injected intravenously .020 gramme of curare.
‡ Injected intravenously .040 gramme of curare.
‖ Injected intravenously .060 gramme of curare.
d. Dead.

(.15°) until the end of two and three-quarter hours, when it began to rise steadily and rapidly, reaching at the conclusion of the seventh hour 43.80°, or 3.25° in excess of normal. In Experiment 3 the temperature began to rise immediately, and continued gradually to increase during the entire period of observation of six and three-quarter hours, when a record of 44.35° was obtained, the dog dying within the next fifteen minutes. The gain here was 3.55°. In Experiment 4 a similar result was noted, the temperature beginning at once to increase and continually rising, until at the end of the six and a half hours, when there was a gain of 4.75°. The enormous amount of curare injected in this experiment makes it of unusual interest. In Experiment 5 no appreciable change was noted during the first hour and a half. A second injection was given. The temperature then increased, the maximum being reached at the end of three hours, representing a rise of .4°. In Experiment 6 there was an increase during the first two hours equal to .3°, which was followed by a fall to below the normal. In Experiment 7 there was a decrease of .05° during the first fifteen minutes, then a slight rise occurred, reaching from .2° to .27° in excess of the normal, the maximum being attained at the end of two and a quarter hours. At this time and subsequently repeated injections gradually lowered it, until at the termination of six hours the temperature was .85° below normal. Excessive doses were also used in this experiment.

Of the results of the other fourteen experiments nothing special need be said further than that they all exhibit the same general downward tendency, especially during the first fifteen minutes, some to a greater degree than others; but during the course of several hours they almost invariably show a decided tendency to return to the normal, notwithstanding repeated injections of the poison. This latter characteristic is well marked in Experiments 17, 18, and 19.

In four other experiments, not included in the above, in which the curare was given hypodermically, and in quantities just insufficient to cause loss of voluntary motion, a primary rise occurred in every case; in two this was followed by a diminution to below the normal, and in the other two the temperature continued above normal during the entire period of six hours' observation. In one of the latter the maximum increase was .45°, and in the other 1.20°.

These results show that curare, in doses just sufficient to cause motor paralysis, acts very differently, and may from the first increase the temperature or decrease the temperature, or produce a primary increase and a secondary decrease, or a decrease followed by a rise above the normal. These variable results from essentially the same doses together indicate that the alterations in temperature are effected by several actions of a very different nature. The fact just alluded to, that in all of the four experiments in which extremely small doses were used a rise occurred; that in Kemp's experiments the rise was particularly marked after the smallest doses, and but transient after large amounts; and that excessive quantities in a single dose cause an immediate and profound decrease, at once suggest that the poison acts primarily as a stimulant, and secondarily as a depressant, on the process of heat production. But the extreme uncertainty of the immediate results following the administration of proportionately the same doses, together with the remarkable increase which occurs in some instances after repeated injections of relatively enormous quantities, and the well-marked tendency of the temperature to rise after a time, even while the animal is thoroughly curarized, controverts this ready explanation, and suggests that the actions are of a decidedly complicated nature.

Leaving for a moment a further consideration of these important points, there are several incidents in the records worthy of special remark, as, for instance, the extraordinary rise of temperature in Experiments 2, 3, and 4. The persistent increase of temperature in Experiment 4 during and after the injection of such enormous quantities of curare is most astonishing. Experiment 7 is an instance where tremendous doses exert relatively extremely little effect. A tolerance seems to be established which apparently becomes greater the longer the animal is under the influence of the drug, so that after a while doses may be given with impunity, and frequently repeated, which, at the outset, would have caused a profound condition of collapse, or even immediate death.

In experiments in which a fall of temperature occurs from the first and progresses, the most rapid decline is usually observed during the first half-hour, the subsequent diminution representing a more gradual descent. In those cases where a decided fall occurs during the first fifteen minutes, the temperature very rarely goes above normal,

less it be after the lapse of several hours, as in Experiment 1.

It has also been noted, from the results of a large number of experiments in addition to the above, that in one group of dogs in almost every successive experiment there will be an increase in temperature, while in another there will invariably occur a decrease. Thus, upon one occasion, in six out of seven dogs there was an increase, while at another time sixteen animals were curarized before an increase could be obtained. All attempts to find a reason for this have proven futile, the curare being the same, the temperature of the surroundings and various suggested circumstances not affording any satisfactory explanation. Doubtless some peculiar temporary condition of the animals is the reason for these remarkable phenomena, because similar experiences have been noted by different investigators in their studies of other functions in normal animals.

SECOND SERIES.—*The Effects of Pyrexial Agents in Animals lightly curarized.*—The statements made from time to time that certain pyretics are still capable of causing their characteristic effects in curarized animals, together with the occasional contradictions which follow, have prompted the study of several of them, chiefly *strychnine*, *picrotoxine*, *cocaine*, *caffeine*, and *pilocarpine*. The preliminary procedures in these experiments were the same as in the preceding series. Immediately after the abolition of voluntary motion, and an accurate temperature record obtained, one of these drugs was given, usually injected into the external jugular vein, and generally in quantities sufficient to produce decided effects in normal animals.

Eleven experiments were performed with *strychnine*, the doses varying from .0005 to .002 gramme to the kilo of body-weight. In seven the temperature was increased, and in four diminished. In all of the seven, with the exception of Experiments 23 and 24, the temperature began at once to rise after giving the strychnine. In Experiment 23 it fell during the first fifteen minutes .13°, which was followed by a rise during the next interval which exceeded the normal. In Experiment 24 the temperature was lowered during the first half-hour .9°, when a reaction occurred, and a point was reached at the end of two and three-quarter hours 1.2° in excess, death taking place during the next half-hour. In all of these seven experiments, however, the rise, once being established, continued to increase, with occasional oscillations, until the conclusions of the experiments or death approached. The periods covered varied from two to seven hours, and the rule is a distinct and practically steady increase, the extent of which varied to some degree with the length of the experiments. The greatest increase was noted in Experiment 22, in which the rectal temperature reached 43.12° C. just before death, the gain being 3.92°. In Experiment 20 the increase was nearly as much,—3.82°. In the other experiments the maximum gains were 1.20°, 2.58°, 1.20°, 2.62°, and 1.55°, the average for all being 2.41° for an average period of observation of about four hours.

Of four experiments with *picrotoxine*, in three an increase occurred, and in one a diminution. In the former the gains were 2.18°, 2.15°, and 1°; in the latter the loss was 1.15°. The average period of observation was a little less than four hours.

Four experiments were made with *cocaine*, in three of which an increase was noted equal to 1.82°, 3.60°, and 1.40°, respectively, and in one a decrease of 2.10°.

In every one of six experiments with caffeine an increase was recorded, in three of which, however, a primary diminution occurred of .08°, .15°, and .35°, respectively. The gains in these were 4.50°, .65°, .17°, 3.25°, 4.60°, and .40°.

Four experiments with pilocarpine all exhibit an increase, the changes amounting to 1.80°, 1.65°, .60°, and .10°.

It will thus be observed that an increase of temperature occurred in seven of eleven experiments with strychnine, in three of four with picrotoxine, in three of four with cocaine, in all of six with caffeine, in all of four with pilocarpine. Hence in this series the proportional number of experiments in which an increase was noted is much greater than in normal animals, the approximate proportions being, in normal animals, about 1 to 4; with strychnine, 2 to 1; with picrotoxine, 3 to 1; with cocaine, 3 to 1; with caffeine, 6 to 0; and with pilocarpine, 4 to 0. It would thus seem that each of these agents may increase the temperature in animals lightly curarized, yet is by no means certain that the change in any case was due to other than the curare, because the temperature curves are clearly not those which would be obtained in normal animals; the curve of increase by curare represents practically a straight line, the highest point being attained after the lapse of several hours, and showing a definite tendency to continue rising the

STRYCHNINE.—*Experiments* 20 *to* 30, *inclusive.* PICROTOXINE.—*Experiments* 31 *to* 34, *inclusive.*

Time.	Exp. 20.	Exp. 21.	Exp. 22.	Exp. 23.	Exp. 24.	Exp. 25.	Exp. 26.	Exp. 27.	Exp. 28.	Exp. 29.	Exp. 30.	Exp. 31.	Exp. 32.	Exp. 33.	Exp. 34.
hrs. min.	5.44 kilos.	5.5 kilos.	23.1 kilos.	22.1 kilos.	7 kilos.	30 kilos.	16 kilos.	13 6 kilos.	5.9 kilos.	4 kilos.	5.9 kilos.	11.5 kilos.	17 23 kilos.	6.4 kilos.	12.5 kilos.
.00	38.18*	38.65†	39.20†	38.82†	38.35†	39.00‡	38.80‡	40.35§	39.20‡	37.65‡	39.20‡	39.92¶	39.80¶	38.60¶	39.80¶
.15	.36	.67	.40	.75	37.92	.45	.92	.45	.20	.40	.14	.95	.78	.—	.52
.30	.52	.80	.55	.85	.45	40.00	39.15	.—	.14	.15	.15	40.02	.—	37.80	.40
.45	.65	.80	.80*	39.18	.50	.30	.42	.15	.20	.02	.20	.10	.85	.—	.42
1.00	.95	.87	.92	.55	.65	.50	.56	.—	.—	36.90	.20	.30	.—	.75	.45
.15	39.15	.95‖	40.02	.77	.95	.75	.77	.10	.—	.65	.20	.55	40.20	.—	.55
.30	.35	39.03	.15	.95	38.15	41.11	.89	.—	38.00	.—	39.00	.72	.—	.55	.60
.45	.72	.20	.45†	40.15	.—	.53	40.05	.—	.00	.—	.—	.80	.40	.—	.67
2.00	.86	.35	.72	.25**	.95	.62	.30	.—	.—	.—	38.40	.95**	.—	.45	.75
.15	40.05	.50	.85	.60	39.40	.....	.30	.15	37.90	35.30	.05	41.12	.70	.—	.96
.30	.26	.60	41.10	.73	.—	.....	.40	.—	.—	.....	38 00	.35	.—	.55	40.04
.45	.42	.60†	.30	.86	.55	.....	.50	39.55	.72	.....	37.95	.56	41.30**	.—	.16
3.00	.45	.65	.45	.92	.25	.....	.60	.—	.—	.....	.90	.80	.—**	.55 ¶	.22
.15	.43	.75	.70**	41.00	*d.*	.....	.70	.30	.60	.....	.72	.97	.70	.85	.43
.30	.35*	.85	.80	.12	.....	.....	.88	.—	.—	.....	.70	42.07	.—	38.00	.45
.45	.15	.80	42.03	.23	.....	.....	.70	.25	.—	.....	.61	.10	.90	*d.*	.80
4.00	.05	.72	.30	.30	.....	.....	.35	.—	.—	.....	.55	.....	.95	.....	*d.*
.15	.36	.55	.40	.40	.....	.....	*d.*	.10	.55‖	.....	.—	.....	.....	.....	.....
.30	41.05	*d.*	.53	.....	.....	.....	.....	*d.*	.....	.....	.—	.....	.....	.....	.....
.45	.10	.....	.65	.....	.....	.....	.....	.....	.....	.....	.—	.....	.....	.....	.....
5.00	.00	.....	.82	.....	.....	.....	.....	.....	.....	.....	.55	.....	.....	.....	.....
.15	.05*	.....	.85‖	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.30	.12	.....	.90**	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.45	.26	.....	.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6.00	.35	.....	43.07	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.15	.52*	.....	.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.30	.90	.....	*d.*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.45	42.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7.00	41.88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gain or loss.	+ 3.82	+ 1.20	+ 3.92	+ 2.58	+ 1.20	+ 2.62	+ 1.55	— 1.25	— 1.65	— 2.35	— 1.65	+ 2.18	+ 2.15	— 1.15	+ 1.00

* Injected .0005 gramme of strychnine for each kilo of body-weight.
‡ Injected .005 gramme of strychnine for each kilo of body-weight.
‖ Muscular twitchings.
** Injected more curare.
† Injected .001 gramme of strychnine for each kilo of body-weight.
§ Injected .002 gramme of strychnine for each kilo of body-weight.
¶ Injected .002 gramme of picrotoxine for each kilo of body-weight.
d. Dead.

COCAINE.—*Experiments* 35 *to* 38, *inclusive.* CAFFEINE.—*Experiments* 39 *to* 44, *inclusive.* PILOCARPINE.—*Experiments* 45 *to* 48, *inclusive.*

Time.	Exp. 35.	Exp. 36.	Exp. 37.	Exp. 38.	Exp. 39.	Exp. 40.	Exp. 41.	Exp. 42.	Exp. 43.	Exp. 44.	Exp. 45.	Exp. 46.	Exp. 47.	Exp. 48.
hrs. min.	21 kilos.	25.8 kilos.	13.6 kilos.	7 kilos.	19.5 kilos.	9 kilos.	31 kilos.	8.16 kilos.	6.5 kilos.	17 kilos.	10.5 kilos.	14 kilos.	7.5 kilos.	7.25 kilos.
.00	38.03†	39.40‡	38.10†	38.55‡	38.80§	39.15§	38.00‖	38.45§	37.95§	39.55‖	39.95¶	39 40¶	39.05¶	40.85¶
.15	.26	.10	.—	37.90	.72	.05	.00	.70*	.97	.—	.78	.55	.60	.92
.30	.50	.35	38.00	.—	.75	.00	.00	.80	.—	.20	.90	.80	.65	.—
.45	.66	.48	.—	.65	.82	.00*	.10*	.85	38.26*	.—	.95	40.15	.65	.95
1.00	.83	.75	37.80	.—	.82*	.00	.15	.91	.—	.30	41.10	.30	.—	.40
.15	39.15	40.05	.—	.50	.75	.90	.12	.85	.62	.—	.20	.45	.35	.—
.30	.—	.25	.40	.—	.80	.85	.12	.78	.—	.45*	.35	.40	.—	.23
.45	.45*	.50*	.—	.45	.90*	.80	.08	.—	39.05*	.—	.45	.50*	.15	.—
2.00	.—	.87	.10	.—	.92	.....	.03	.65*	.—*	.50	.60	.50	.12	.40
.15	.85	41.00	.—	.45	39.23*	.....	.09	.70	.12	.—	.65	.60	.—	.—
.30	.....	.40	.05	.50	.50	.....	.17	.75	.—	.58‖	.75	.70	38.67	39.95
.45	.....	.55*	.—	.65	.80	.....	.12	.65	.22	.—	.85	.75	.35	.95
3.00	.....	.72	.10	.85	40.12	.....	.....	.60	.—	.56	.90	.75	*d.*	.....
.15	.....	.90	.—	38.15	.55	.....	.....	.60§	.40	.—	.—	.75*	.....	.....
.30	.....	42.05	.10	.—	41.00	.....	.....	.70*	.60	.60	41.15	.70*	.....	.....
.45	.....	.30	.—	.45*	.35	.....	.....	.85	.70*	.62*	.15	.72	.....	.....
4.00	.....	.52	36.90	.—	.75	.....	.....	.—	40.00	.55	.20¶	.67	.....	.....
.15	.....	.83	.—	.90	42.30	.....	.....	39.55	.35	.60*	.30	.75	.....	.....
.30	.....	.90	.35	.—‡	.87	.....	.....	.95	.58	.65*	.50	.80	.....	.....
.45	.....	43.00	.—	39.35	43.35	.....	.....	40.37	.80*	.82*	.75	.80	.....	.....
5.00	.....	.....	.00	.—	.37	.....	.....	.80	41.00	.95	.60	.80	.....	.....
.15	.....	.....	.....	.45	.30*d.*	.....	.....	41.30	.35	.70	*d.*	.95	.....	.....
.30	.....	.....	.....	.—	.....	.....	.....	.65*d.*	.73	.....	.....	.93	.....	.....
.45	.....	.....	.....	.10	.....	.....	.....	.70	.83	.....	.....	41.05	.....	.....
6.00	.....	.....	.....	.—	.....	.....	.....	.....	42.35	.....	.....	39.90	.....	.....
.15	.....	.....	.....	.40	.....	.....	.....	.....	.35	.....	.....	.....	.....	.....
.30	.....	.....	.....	.—	.....	.....	.....	.....	.65	.....	.....	.....	.....	.....
.45	.....	.....	.....	.65	.....	.....	.....	.....	.65	.....	.....	.....	.....	.....
7.00	.....	.....	.....	.—	.....	.....	.....	.....	.55	.....	.....	.....	.....	.....
.15	.....	.....	.....	.95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gain or loss.	+ 1.82	+ 3.60	— 2.10	+ 1.40	+ 4.50	+ 0.65	+ 0.17	+ 3.25	+ 4.60	+ 0.40	+ 1.80	+ 1.65	+ 0.60	+ 0.10

* Curare given.

† Injected .01 gramme of cocaine hydrochlorate per kilo of body-weight hypodermically.

‡ Injected .02 gramme of cocaine hydrochlorate per kilo of body-weight hypodermically.

§ Injected .10 gramme of caffeine per kilo of body-weight hypodermically.

‖ Injected .05 gramme of caffeine per kilo of body-weight hypodermically.

¶ Injected .001 gramme of pilocarpine per kilo of body-weight hypodermically. *d.* Dead.

longer the observations were conducted, and, indeed, until pyrexia itself becomes a fatal element; the curves shown by strychnine, cocaine, etc., in normal animals, represents a rapid ascent and a similar decline, the climax commonly being passed during the first or second hour. The differences in the characters of the curves are strikingly evident when we compare those produced by cocaine and caffeine in normal and curarized animals. They are entirely dissimilar, and in the latter are typical curare curves. Whether the increase in these experiments was due to the curare, or whether the usual course of effects by these drugs on the heat processes is modified in the curarized condition, is not certain. The results of the experiments in the fourth series, which will shortly be referred to, seem to render it apparent that the curare is not altogether responsible.

(To be continued.)

ACTION OF OIL ON THE ANIMAL ORGANISM.

By W. C. Caldwell, M.D., Chicago, Ill.*

THE important action of oils is after entering the circulation, so a knowledge of the conditions for absorption is as necessary as an understanding of how it acts. I will first consider the absorption of oils, and then the action of oils in health and disease.

I. ABSORPTION.

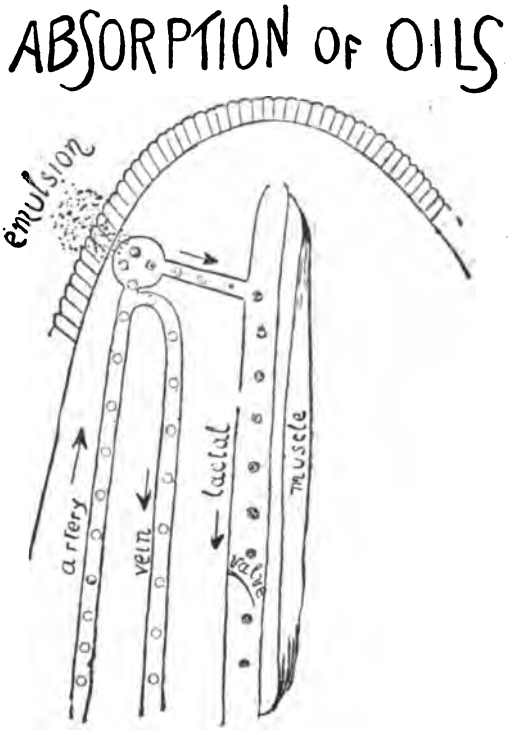
Oils may be absorbed in limited quantity from the skin and mucous membranes by passing into the lymph-spaces, but this is by no means sufficient for the needs of the body in the higher vertebrates; hence the necessity for the differentiation of a special mechanism for the absorption of oils. This mechanism is located in the small intestine. I shall confine myself entirely to a consideration of absorption by this mechanism.

I will present the subject in the following order:

1. Mechanism of absorption.
2. Forces causing the oil to pass inward.
3. Conditions diminishing absorption.
4. Conditions increasing absorption.
5. Relation of liver to absorption of both oils and non-oils.

Mechanism of Absorption.—The millions of villi mainly situated in the duodenum and jejunum constitute the mechanism. As shown in the accompanying diagram (1),

DIAGRAM I.



each villus consists of a conical projection covered by a single layer of columnar epithelium on a basement membrane, beneath which and occupying the villus is a spongy network of adenoid tissue whose intercommunicating channels extend from the lymph-spaces beneath epithelium to a central tube called the lacteal. This lacteal has valves opening centreward, and around it, extending from apex to base, are arranged longitudinally unstriped muscular fibres. There are also some muscular fibres running transversely. As shown in the diagram, a small artery is placed eccentrically in each villus.

1. The route the oil takes in its passage from the intestinal tube to the venous circulation is through the columnar epithelium into the lymph-spaces, and there it enters the white corpuscles, and passes along the irregular lymph-channels to the central lacteal, and then through the chyle vessels into the thoracic duct, which carries it to the subclavian vein.

2. Because the proteids and carbohydrates are rendered capable of osmosis by digestion, they readily pass directly into the portal veins, and hence reach the circulation without taking such a circuitous route.

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3. But the oils are not so easily handled. Oils have so little affinity for water that they will not osmose, and it is very difficult to convert them into new compounds (unlike the proteids and carbohydrates, which are easily transformed into soluble compounds) capable of osmosis; hence the necessity in the evolution of the vertebrates to develop a special mechanism for their absorption.

4. However, it must not be forgotten that the pancreatic juice attempts to render the oils osmosible, and succeeds to a very limited extent. It does this by splitting a small part of the oil into its component parts, glycerin and fatty acids. The glycerin, having affinity for water, diffuses through the mucous membrane. The fatty acids combine with the alkalies of bile and intestinal juice, and then, as soaps, diffuse inward.

5. But the great part of the oil remains *chemically unchanged*, hence some other means of absorption becomes necessary. The oil is broken up into microscopic particles, each of which is then covered with a film of material that has greater affinity for water than the oil. This coating, having so much greater affinity for the tissues, enables the screened oil to make the trip without so much opposition. The material used for this coating is alkaline albuminate and soap. A mass of these film-covered globules is called an emulsion, and it is mainly by converting the oil into an emulsion that it is absorbed.

6. The bile and pancreatic juice prepare the oils for absorption, and they do this in the following ways:

(1) The bile saponifies any free acid that may be present, so that it can enter the portal vessels.

(2) Pancreatic juice hydrates and splits up a small part of the oil so that the bile may saponify the acid.

(3) Both bile and pancreatic juice emulsify the large remaining portion.

(4) Bile also has another very important function in absorption, and that is, by bathing the mucous membrane the penetration of the oil is greatly facilitated.

Years ago, Wistinghausen showed that oil will rise higher in capillary tubes moistened with bile than in those moistened with water. He also showed that by moistening a membrane with bile the oil will pass through more readily than through a membrane saturated with water. In dogs with biliary fistulæ there is less fat in the chyle and more in the fæces, showing the important relation of the bile.

When in similar ligatured loops of the living intestine oil alone, and oil with bile, are injected, it is found, after the animal is killed, that much more of the oil that was injected with the bile is absorbed.

It is probable that the way the bile increases absorption is due to the fact that the bile has affinity for both water and oils, and hence can take the oil along with it into the water-soaked tissue.

Then, in summing up this, remember that the bile promotes absorption—

1. By saponifying the fatty acids.
2. By aiding to emulsify the oil.
3. By moistening the mucous membrane.

Remember also that the pancreatic juice promotes absorption—

1. By hydrating and splitting up the oil into glycerin and fatty acids. The glycerin and the fatty acid as soap, both being soluble, pass into the portal capillaries, and, through the influence of an unknown ferment, unite again to form oil. Perewoznikoff and Will, after injecting soap and glycerin into the intestinal canal, found neutral fat in the villi. Ewald found that fat was formed from soap and glycerin in the presence of the intestinal mucous membrane.
2. By emulsifying the oil.

Having shown that the bile and pancreatic juice—

1. Render a small part osmosible.
2. Render a large part less repulsive by emulsification,

I am now ready to consider what forces—

1. Carry the emulsion through the columnar epithelium, and then—
2. Carry it from there into the chyle-ducts.

It is probable that the epithelium, like the amœba, throws out around the fatty particles pseudopodia, which, retracting, draw the fat into the epithelial cell.

Then, again, it is probable that the affinity of the protoplasm of the epithelial cell for the albuminous film over the oil-globules draws them into the cells.

After having entered the cells they pass through into the white corpuscles in the subjacent lymph-spaces. It is likely that for some unknown reason the corpuscles have greater affinity for these globules, and hence attract them into them.

A part of the white corpuscles in the eccentric artery, as shown in Diagram 1 wander into the lymph-spaces, become loaded with the fatty granules. Then these loaded leu-

cocytes are forced through the lymph-channels into the central lacteal by the pumping force of the villus, brought about by the contraction of longitudinal and transverse muscles pressing the liquid out of the lacteal beyond the valve; then the relaxation of these muscles, having a tendency to produce a vacuum, draws the leucocytes centreward to be in turn pumped beyond the valve into the chyle-duct.

When you remember the mechanism of absorption you will readily see that absorption will be diminished by diseases which derange—

1. *The liver.*—Any of the acute or chronic diseases which interfere with the secretion of bile just so much disturb absorption of fats. Typhoid fever, where there is extensive degeneration of the hepatic parenchyma, causing light-colored stools, diminishes absorption. When there is a coated tongue, indicating that the liver is not working properly, oils do not agree. Hence, cod-liver oil should be withheld in cases of phthisis and other wasting diseases when the tongue is coated. For this reason, in consumption, where the tongue is habitually coated, not much can be expected from cod-liver oil. People who have small livers are ill adapted for digestion of fats.

2. *The pancreas.*—Any diseases that interfere with the function of the pancreas cripple the emulsification and absorption of the oils.

Of course, to promote absorption of the oils it is necessary to see to the functional activity of the liver and pancreas. *Always clean the tongue before giving oils.* This can be done with calomel and salines.

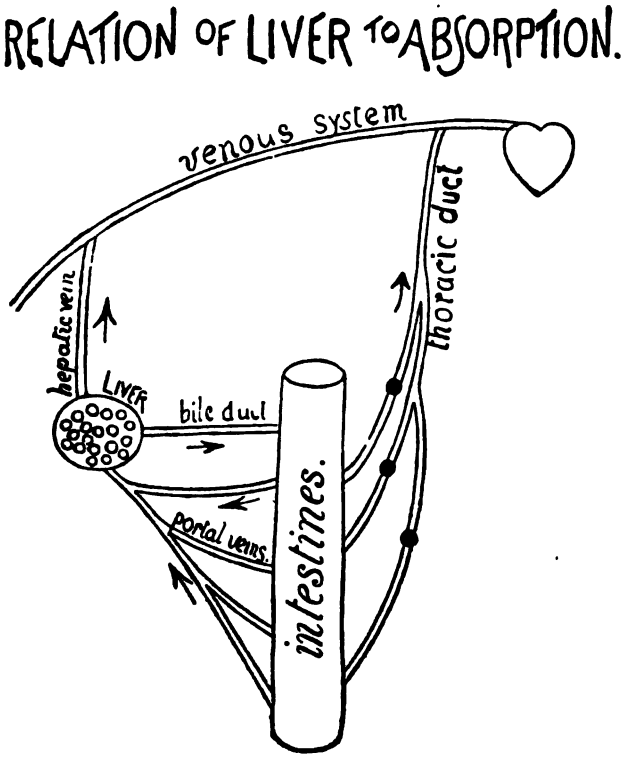
It is said that ether aids absorption by stimulating the pancreas.

In case absorption is still sluggish it may be increased by supplying what nature has failed to do,—bile and pancreatic juice.

From what I have said it is evident that the liver holds an important relation to the absorption of oils, but for an entirely different reason it holds an equally important relation to the absorption of the proteids and carbohydrates.

By examining Diagram 2 this relation will be evident. The oils require a normal action of the liver that there may be a proper quantity of bile to emulsify them so that they can pass to the circulation through the lymphatics. The proteids and carbohydrates do not require a normal liver for that purpose but this relation is due to the anatomical fact that the liver is the gate-way for these materials to pass to the systemic circulation

DIAGRAM 2.



Hence, when this portal is closed their absorption is hindered just as much as the oils are by a deficient quantity of bile.

The practical conclusion to be drawn from this is that, when the liver is out of order all absorption is interfered with, the absorption of all kinds of food is diminished. Hence, when the tongue is coated, absorption is sluggish. Since the absorption of nutrient material is so important to keep up the powers of life, the condition of the tongue should never be overlooked in the treatment of disease.

II. ACTIONS IN HEALTH.

I will consider only the actions of oils after entering the circulation. The protoplasm of a cell consists of its frame-work and the material stored in it that can be used in liberating energy to perform its function, whether glandular, muscular, or nervous. When a muscle contracts, there takes place the combustion of a certain amount of fuel whose liberated energy causes the muscle phenomena. The cell may be compared to a furnace, consisting of the furnace proper and coal. The frame-work of the cell is formed of the proteids and salts, fuel stored in it for combustion consists of fat and glycogen. Hence the oils have a very important function in the cell. Without this fuel, protoplasm would have very little power to work. Every one knows how much more easily oil burns than lean meat. A substance burns easily in proportion to the absence of oxygen from its composition, and the presence of easily oxidizable elements. Fats contain only about ten per cent. of oxygen, the remainder consisting of carbon and hydrogen. For this reason fats possess greater power of force-production than any other alimentary substances. The proteids can be burnt, but it is a very poor fire, and a very expensive fire. For the animal organism to burn proteids (cell-structure) would be like burning the engine-house instead of coal. However, in high fevers this occurs to the great detriment of the patient, resulting in emaciation as the nitrogenous structures are melted down.

The fact that oil is the fuel of the cells produces two distinct effects:

1. It supplies material so that the cells can do more work.

2. This energetic action of the cells increases their vitality. Organs that are inactive atrophy; so with cells, and especially is this marked in the successive generations. If the cells are active, each succeeding generation is stronger; if inactive, each generation is weaker.

The oil, as it were, by increasing the exercise of the cells, develops them. This gymnastic exercise, kept up during successive generations of cells, makes a very marked improvement in the vigor of them.

This secondary action is a very important factor in improving the poorly-developed cells.

There is difference of opinion as to what part of cod liver oil is of such great service.

Wood classifies it as an alterative, and thinks that it has some peculiar action on the blood-making organs.

Bruce regards the action of the oil as a food of the first importance, while the iodine, bromine, etc., are only secondary.

Bartholow thinks that its therapeutic value depends not only upon the oil, but also upon the gaduin and other ingredients.

Chapateau believes that it is the morrhuol that is of service.

The value of an oil is based on the following three facts:

1. Its agreeableness to take.

2. Its rate of absorption.

3. Its rate of oxidation, so that it will the more readily burn and give off energy to the weak cells.

While cod-liver oil is very unpleasant to take, yet it is superior to all others as to rate of absorption and oxidation:

Nauman found, in testing with permanganate of potassium the comparative rate of oxidation of oils, that cod-liver oil was much more easily oxidized than the others.

III. SYNERGISTS.

All drugs that by any means improve the vital functions may at some time be synergistic. Hence, those drugs which are foods, as iron, manganese, and phosphorus, are often of great service when combined with cod-liver oil. All drugs that increase digestion, as bitters, acids, etc., by enabling more material for the blood to be prepared, like cod-liver oil, increase the food for the cells. All drugs that increase the functional activity of other mechanisms, as by stimulating respiration purer blood circulates through the tissues, as by stimulating the circulatory mechanism more food is carried to the tissues, are, of course, synergists with cod-liver oil in building up the weak cells.

IV. ACTIONS IN DISEASE.

The use of oil is based on the fact that it is the natural fuel for protoplasmic activity

Oil has no specific action in any particular disease, but it simply improves the nutrition of the cell by increasing its power to work. This increased activity improves its power to grow and multiply, and hence there results stronger and more vigorous cells better prepared to battle in the struggle for life. Better able to resist the encroachment of an invading army of pathogenic microbes. The indication for the use of cod-liver oil is where there is defective cellular activity, where there is not sufficient power in the cells to become fully developed and hence die young.

This condition may be inherited or acquired. For this reason cod-liver oil is an efficacious remedy in the scrofulous diathesis, where the cells do not have sufficient inherent vitality to mature, but appear to spend what little energy there is in the excessive proliferation of imperfect cells that soon die. This manifests itself in hyperplasia of the lymphatics, respiratory mucous membrane, and pulmonary alveoli. Since this excessive proliferation of weak cells in the pulmonary alveoli makes a fertile soil for tuberculosis, cod-liver oil, by removing the bronchitis or catarrhal pneumonia, may prevent or even arrest incipient phthisis. It is of equal service where the proliferation is in the ends of the bones, as in chronic arthritis (tuberculosis), or in the shaft of the bone.

But it is not only indicated where this weakness is inherited, but where disease has so depraved the nutrition that the cells do not have sufficient vitality to propagate healthy cells. Hence, cod-liver oil is beneficial at times in the cachexia of tertiary syphilis, in chronic rheumatism, neuralgia, and skin-diseases. It is also of use in the slow convalescence from acute diseases, as from the sequelæ of scarlet fever. Badly-nourished, emaciated infants, suffering with chronic intestinal disorders, are sometimes benefited by inunction with cod-liver oil.

THE CLIMATE OF SOUTHERN CALIFORNIA.

By F. Gundrum, M.D., Escondido Valley, Cal.

I WISH to make a few additional remarks to my article in the November number of the Therapeutic Gazette, and also to note one or two points in a communication from the pen of Dr. C. R. Orcutt, of San Diego, Cal. I was rather indefinite in my remarks as to the diurnal variation of temperature, which I wish to correct by making it more definite.

While living at "Marilon Park," two and a quarter miles from San Diego, I noted a change of 42° F. from 2 P.M. to 6 A.M. the next day, not only once but several times, during January, 1888. During pretty much the whole of the month of November, 1890, we had an east wind,—a strong gale,—during which time the daily variation in temperature was remarkable. The thermometer at my ranch varied, from 2 to 3 P.M. to next morning, from 90°–94° to 38°–44°, the maximum being 94° and the minimum 38° F., making a difference of 56° F. At the lower end of this valley the difference was still greater, amounting to 62° F. During this weather almost everybody contracted cold, all felt badly, and this extended to the lower animals.

Dr. Orcutt makes the statement that "tuberculosis never originates under such climatic conditions as here [San Diego] exist," etc. and "at San Diego tuberculosis is invariably arrested and cured in the earlier stages, and it is only to our equable climate *and the dryness of our atmosphere that this seaport town can claim any peculiar advantages*," etc. (italics mine).

I am very sorry, indeed, that Dr. Orcutt has made such positive and sweeping remarks, as my personal observation is to the contrary. That consumption or tuberculosis never occur in San Diego is a great mistake, and I personally know of at least two cases; and, having been convinced that at least two occurred, he may find others by diligent research.

A young lady died of pulmonary consumption a few years ago at San Diego who lived there from childhood up, dying at the age of twenty-two. It was Miss Cora Nickols, and the doctor can assure himself of the correctness of my statement by interviewing the mother, who lives on the northwest corner of Cedar and Third Streets. I attended a girl, 11 years of age, while I lived in San Diego, who died of tuberculosis of the intestines. This patient was born in the middle of this State, and came to San Diego, in perfect health, three years before her death. There is a lady in this valley (a much healthier place than San Diego) who contracted consumption here, and is now in the third stage of that disease. The doctor is as nearly correct in stating that all cases are cured if they come to San Diego in the earlier stages of phthisis.

The doctor did make one statement which is correct,—viz., that the climate at San Die

is very equable. There are few places in the world that can boast of a more equable temperature, but when he makes the statement that it is a dry atmosphere, he is away off. It is one of the most humid atmospheres in the world, with this exception, that when the wind from the desert is strong enough to drive back the wind from the ocean, then the humidity is at a minimum. But when this is not the case, the atmospheric humidity runs high. Major-General Stuart Stanly, of the British army, spent two years in this part of the country, and made many scientific observations. He told me that there was only one place in the world where the humidity ranged higher than at San Diego,—viz., at the island of St. Helena. The humidity at San Diego runs all the way from the 70's to the 90's. The statements of General Stanly, and what notice I have taken of the signal service report at San Diego, confirm this.

And last, but not least, I must notice "Poor Lo," the long-living Indian. It is a fact that "Poor Lo" lives a long time here, and so he used to in the South, North, and East. But they do not all live from one hundred to one hundred and fifty years. Some have even died of consumption. The longevity of the native Indian is always open to criticism, as they keep no kind of record of their birth, and a misfortune it is that George Washington did not live out here, so that their age could be estimated to some degree of certainty, like the long-living negroes of the South.

I desire to have nothing but facts put before the medical profession about the climate of Southern California, and the facts are good enough. This valley is probably as fine a climate as can be found in Southern California at the same elevation and distance from the ocean; but there are persons whom I have consulted that cannot live here, but live with great satisfaction ten to fifteen miles farther inland and one thousand feet higher above the ocean-level. Others, who could not remain at San Diego, enjoy life here.

Careful observation, truthfully stated, will set this matter right in the end.

THE THERAPEUTIC USES OF OXALIC ACID.

By A. W. Marsh, M.D., Oriskany Falls, N. Y.

AMONG the many remedies recommended in late years for amenorrhœa, the one that has proved most valuable, in my hands, is oxalic acid, as suggested by Dr. F. Paulet.

It has none of the objectionable, and nearly all of the valuable, qualities possessed by the other emmenagogues. It is not unpalatable, non-irritating to the stomach in medicinal doses, certain in its action, has no oxytocic properties, and, more valuable still, it may be used in all cases of amenorrhœa where an emmenagogue is applicable. I have used it for four years in all such cases with the best effect possible.

It was while using the acid in the above-mentioned cases that I discovered another valuable use of the drug, which I have never seen referred to, and that is its sedative action in acute cystitis.

The following are a few of the many cases in which I have used it, and I have yet to record the first failure.

Case I.—Miss C., aged 26. Had been under homœopathic treatment two or three years for spondylitis and uterine prolapse. Had developed, several months previous to my first visit, a vesical inflammation, primarily from the continued use of cantharidic blisters, without proper precautions. This condition was aggravated and kept up by the prolapsed condition of the uterus. For the cystitis I gave her the following:

℞ Acid. oxalic., gr. xvi;
Syr. aurantii cor., ℥i;
Aquæ pluv., q.s. ℥iv. M.
Sig.—Teaspoonful every four hours.

The result was all that could be desired,—the acute symptoms all subsided immediately, and a few days saw her completely free from the vesical irritation.

Case II.—Mrs. A., widow, aged 75. She has had several attacks of cystitis. Treated her with hyoscyamus, triticum repens, corn-silk, and pichi at different times, with rather unsatisfactory results, the inflammation continuing two or three weeks at a time. When another attack occurred, I gave the above prescription. The result was magical. In less than twenty-four hours the pain, tenesmus, and frequent desire to micturate had all disappeared, and, after two or three days, no evidence of the trouble remained.

Case III.—A. B., aged 18. He retained his urine several hours after a desire to evacuate the bladder occurred. The distention was so great that he had much difficulty in emptying the bladder, when he did make the attempt.

The result was an attack of acute cystitis. The pain and tenesmus were great, and the desire to urinate occurred every fifteen or twenty minutes. Gave the acid, and in two days he was completely cured.

CASE IV.—Mr. W. Had mild attack of cystitis, caused by the influenza. Cured in twelve hours by the acid. In this case the patient doubled the dose, and continued its use for several days after pain and tenesmus of bladder had ceased. From this excess of the acid he had some scalding from urine and griping pain in bowels. This is the only case when such symptoms developed.

CASE V.—Mrs. J., aged 60, married. Complained of frequent desire to urinate, accompanied with pain and straining. Gave the acid, and directed her to avoid straining, etc. Found her better next day. Three weeks later found her worse than ever. The tenesmus was almost constant, and the urine dribbled away most of the time. Her limbs were swollen, and nephritis was suspected, though no albumen was found, but the microscope afterwards revealed casts in abundance. I again gave the acid, and within three days all the pain and straining had disappeared, although some soreness remained several days longer. She was able to retain the urine several hours, and had no further trouble with the bladder.

The above cases have been selected to show the different causes that produced the cystitis in which the acid was used. The cases might be multiplied, all showing the same marked results.

The action of the remedy is rapid and the results certain, and it may be used in all cases of acute cystitis, from whatever cause, care being taken to use either rain- or distilled water, to prevent the formation of oxalate of lime.

THE TREATMENT OF FURUNCULOSIS.

According to DR. VEIEL (*Centralblatt für die Gesammte Therapie*, January, 1891) the treatment of furunculosis includes the observation of the four following indications:

1. The pus-forming micrococci which have penetrated into the skin must be destroyed by antiparasitical measures before they have produced tissue-changes.

2. When tissue necrosis has occurred, the indication is then to accelerate the exfoliation of the dead tissues, so as to remove the micrococci as rapidly as possible.

3. To prevent new formation of furuncles from first infection.

4. To place the organism in such a condition that it may be most capable of resisting the infection of the pus forming micro-organisms.

The author shows that the first of these principles can be accomplished in but few cases if the infection of micro-organisms is so far extended as to lead to visible alterations in the skin and swelling, or to the formation of blisters, for then necrosis has already commenced, and the excretory ducts of the glands are already obstructed by exudation products. Consequently, the introduction of antiseptics into the gland, through friction applied to the external surface, is already impossible. In this condition the use of the carbolate of mercury plaster of Unna, or the concentrated alcohol solutions of boric acid, are of no avail, while the injections of three per cent. of carbolic acid solution, as recommended by Bidder, or the introduction of a silver wire coated with nitrate of silver are both unreliable and extremely painful. Consequently, in the majority of cases, attention must be paid to the second indication above mentioned,—that is, the facilitation of the removal of the necrotic fragment and the microbes included within it. Here the author, contrary to the general modern view, is strongly in favor of warm applications, since he maintains that there is no measure which so rapidly or so certainly leads to the desired result. In order to prevent infection of neighboring parts through the micro-organisms which accumulate on the poultice, he recommends the washing of the skin with a 1 to 1000 sublimate solution or a four per cent. boric acid solution. At night he recommends that the furuncle be covered with an ointment composed of equal parts of oxide of zinc and vaseline with four per cent. boric acid. This ointment is also claimed to fulfil the third indication above mentioned,—that is, to prevent extension of the infection,—while great attention must be paid to cleanliness. The fourth indication is fulfilled by liberal diet; the preparations of iron to combat anæmia and systemic affections must be properly combated. Arsenic he prefers to all other remedies, although he also strongly recommends the use of sulphide of calcium in furunculosis, as well as in impetigo, acne, and sycosis. He condemns the use of cathartics.

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Leading Articles.

RECENT RESEARCHES AS TO THE PRODUCTION OF IMMUNITY FROM DIPHTHERIA.

THE excitement which was evoked by the recent claim as to the prevention and cure of tuberculosis is largely chargeable, if nothing else could be urged against it, with the lack of attention attracted by a number of highly important contributions which have recently been published as to the nature and prevention of diphtheria, and which, to the unbiased observer, afford much more ground for sanguine hope as to the prevention of a scourge scarcely less virulent than tuberculosis; while the unassuming character of the statements made, and the highly scientific nature of the mode of procedure, affords a very pleasant contrast to the tuberculosis furor. With the single exception of tuberculosis, there is no one among the infectious diseases which, in the last few years, has been studied with greater profit. The specific agent of the disease has been recognized, its etiological properties studied, the poison isolated, and its mode of action determined; and while yet much is to be done in determining the exact condition through which immunity to this affection may be conferred, the facts which have been attained are of sufficient importance and value to warrant the greatest hope that ultimate success will soon be attained. Further, the methods of study are not only valuable from the results which have been acquired as regards diphtheria, but especially as to the application of similar methods to the study of the other infectious diseases.

Klebs, at the Congress in Wiesbaden, in 1883, was the first to recognize the presence of the specific bacillus in diphtheritic false membranes and in adjacent mucous membrane, while Loeffler positively stated the existence of the bacillus in twenty-five cases of diphtheria, and was able to obtain pure cultures of bacilli, and to successfully inoculate birds, chickens, rabbits, and guinea-pigs, with the reproduction of the false membrane. Loeffler's results were, however, not accepted without question, for in no case was there any consequent paralysis in cases which did not prove fatal, and similar bacilli were recognized in the mouth of apparently healthy individuals.

Hoffman, in 1888 (*Wiener Med. Woch.*, Nos. 3 and 4), was even more positive than Loeffler as to the specific character of the bacilli, recognizing them located in the false membrane in a large number of cases of diphtheria, while he also stated that they were to be met with in certain cases of scarlatinal angina, and in the sore throat of measles. Such was the state of the question when it was reopened by Roux and Yersin in experiments made in the Pasteur Institute in 1888, 1889, and 1890. In their first publication, these authors stated that they had recognized this specific bacillus in all cases of diphtheria examined, and that they were able to produce not only the false membrane and all the characteristics of a marked case of this infectious disease in the guinea-pig, the rabbit, and the dog, and the fowl, but that diphtheritic paralysis also followed, whether as a consequence of pharyngeal or tracheal inoculation, or intravenous injections, in cases which did not prove fatal. These authors also stated that they were able to recognize the difference between the specific diphtheritic bacillus and the non-violent pseudo-bacillus found in the mouth of healthy persons, or in cases of non-diphtheritic angina. They claimed that this non-virulent bacillus is very rare in fatal diphtheria, is more abundant in the benign

cases of diphtheria, and becomes still more abundant as severe cases of diphtheria progress towards cure, while during the convalescence in such cases it is much more abundant than in the mouth of healthy persons. It would, therefore, seem that there is a close relationship between the two bacilli, the latter apparently being an attenuated form of the former.

These authors' first publications were very shortly followed by papers by Prudden and Northrup, in the *American Journal of the Medical Sciences*, June, 1889, while Babes (*Zeit. f. Hygien*, vol. v. p. 177) found the bacillus of Klebs in forty-two cases of diphtheria.

D'Espine (*Revue Méd. Suis Romande*, 1888, No. 1) found it in fourteen cases of diphtheritic angina, while it was absent in twenty-four cases of non-diphtheritic sore throat. Ortmann (*Berliner Klin. Woch.*, No. 10, 1889) found it fifteen times out of sixteen, while Kalo Paltauf (*Wiener Klin. Woch.*, 1888) found it in fifty cases of diphtheria. Beck (*Zeit. f. Hygien*, Band 8, Heft 3) found likewise the bacillus of Klebs in fifty-two cases which he examined, and he believes that the bacillus appears first in cases of diphtheria, and is then followed by the streptococci, which, penetrating into the circulation, provoke the severe general symptoms characteristic of malignant cases of this disease. No evidence whatever is apparently attainable which will support this hypothesis.

The bacillus of Klebs is ordinarily found on the free surface of the false membrane, but in some cases the most superficial layer of the membrane is covered by different forms of microbes in which the bacilli of Klebs nevertheless predominate. These bacilli are colored with methyl blue, reproduce themselves rapidly at a temperature of 33° C. on coagulated serum; more slowly on gelatin. The bacillus is about the same length as the bacillus of tuberculosis, but thinner, while its rounded extremities are more deeply stained than the middle part. It is movable, and rapidly reproduces itself in liquid media, while, when developed in fluid cultures, an acid reaction is developed, which finally gives place to an alkaline reaction. The bacillus of diphtheria may be preserved for months at a time, and cultures have been found virulent after five months retention at a temperature of 33°. When dried and preserved at this temperature they lose their virulence at about three or four months. The false membrane, however, preserves its virulence even after five months' desiccation. These facts are extremely important, and will explain many cases of the apparently spontaneous origin of diphtheria. Thus, Sylvestre, in *Le Progrès Médical*, 1890, pp. 353, 393, and 414, quoted a case of diphtheria in a young man, which developed a few days after contact with the clothing of his mother, who had died two years previously with diphtheria, the clothes having been kept during all that time in a closet, where the dampness and absence of light furnished the most favorable conditions for the preservation of the virus. So, also, a case is reported by Dr. Worms (*ibid.*), where diphtheria was produced by the use of an old camel's-hair brush, and the inquest demonstrated that five years previously this brush, which had been kept all this time wrapped up in paper, had been used in a case of diphtheria.

Another etiological cause to be considered in the study of the propagation is the fact that the diphtheria of the common fowl may be communicated in the most virulent form of the disease to man. Wolff (*Berliner Klin. Woch*, 1883) and Wurdman (*Deutsche Med. Woch.*, 1886) have reported numerous cases of this character, while Delthill (*La Médecinè Moderne*, No. 42, 1887), in a memoir read before the Académie de Médecin, reports fifteen cases coming under his observation, which seem to show in the clearest manner the transmission of diphtheria from animals, and above all from birds to man. So, also, Dr. Davidson (*British Medical Journal*, October 25, 1890) refers to numerous other cases where the same origin of the disease was probable.

It has, however, been proved that the bacillus of Klebs, or the diphtheritic virus, placed in contact with a perfectly healthy mucous membrane, does not provoke diphtheria, but that there must be some lesion or erosion to permit infection; consequently, the mortality of diphtheria is much more elevated in cold weather, and the researches of Bruhl clearly establish this fact. Thus, it results from statistics, the more uniform the temperature the less the mortality.

A point which at first excited considerable doubt as to the actual etiological value of the bacillus of Klebs was the observation made by a number of bacteriologists that this bacillus never invaded the different organs of the body, and was never found in the blood of patients or of animals inoculated with it, but was confined invariably to the false membrane. It is, therefore, not the bacillus itself

which produces the serious symptoms which characterize diphtheria, and it is now generally admitted that these symptoms are produced by a poison secreted at the point of infection by the bacillus, and carried by the general circulation into the system at large. This idea was first suggested by Loeffler, who considered the poison as a diastase, and his views were likewise investigated by Roux and Yersin, who were able to greatly extend our knowledge of the *modus operandi* of this bacillus.

A paper published in *La Tribune Médicale* for January 29, 1891, to which we are indebted for many of the preceding facts, is mainly devoted to an analysis of the works of these latter authors, who for the last three years have been incessantly occupied with the study of this subject. At first Drs. Roux and Yersin experimented with cultures sterilized by filtration through porcelain. In varying the dose in inoculation, under the skin or injected into the trachea or into the veins, they were enabled to produce either the death of the animal, or a characteristic diphtheritic paralysis, which sometimes was cured, or which sometimes led to the death of the animal. In the autopsy of all animals so inoculated, whether chickens, rabbits, guinea-pigs, or dogs, there were found the same lesions as occurred in animals inoculated with the cultures of the bacilli itself; the same œdema, the same indurated tissue at the point of injection, the false membrane only being wanting; consequently their experiment seemed to prove that some substance developed by the bacillus and its culture passed into the solution and was contained in the filtrate. Roux and Yersin also pronounced this poison as a diastase on account of the manner in which this filtered liquid behaved when exposed to the air and to heat, both of these agents appearing to diminish the virulence of the product in a marked degree. When evaporated, the filtered cultures left a dry residue, of which a part was soluble in alcohol and another part soluble in water. The alcoholic solution was free from all pathogenic properties. On the other hand, the aqueous extract was excessively toxic, and consequently contained the toxic principles. They also found that the diastase could be precipitated from the aqueous solution by a ninety per cent. alcohol solution in the filtered cultures or by the addition of lime or phosphate of calcium. In these cases the active principle adhered to the precipitate, and, introduced under the skin of animals, produced the same symptoms as the inoculation of the filtered cultures or the cultures still containing the bacilli. It is evident that these methods all indicate that we have to deal in such cases with something of the nature of a ferment. To obtain this diastase in a state of purity, recourse must be had to dialysis, since it also will pass through an animal membrane, and may then be obtained in a state of purity by dialyzing the filtered culture, which will still possess toxic properties.

These results as to the mode of action of these poisonous emanations from the bacilli have likewise been confirmed by Babes (*Virchow's Archiv*, Bd. cxix., 1890, p. 460), though he extended the matter still further by his success in the developing of false membrane and paralysis as the result of the inoculation with these filtered cultures. Brieger and Fraenkel (*Berliner Klin. Woch.*, 1890, Nos. 11 and 12) have, in addition, produced satisfactory proof of the fact that this poison secreted by the bacilli is not a ptomaïne and is not of a crystalline character. It apparently is more of the nature of a proteid, for, on saturating the bacillus cultures with ammonium sulphate, a precipitate is obtained which is insoluble in alcohol but soluble in water, and developing the biuret reaction for proteids. It is these authors who first introduced the name of "toxalbumen" as applied to this derivative of the bacilli, which they regard as a derivative of albumen, closely agreeing with serum albumen in its nature. When inoculated into animals, this substance is seen to be extremely toxic, is fatal in the dose of about $\frac{1}{25}$ grain for every two pounds of body-weight, while in smaller doses it produces the same phenomena and the same lesions as the bacillus cultures or those in which the bacilli are still present, although usually false membranes were absent.

Leaving now the considerations as to the pathology of diphtheria, we reach a stage of the question of more interest to the general practitioner,—that is, Can diphtheria be prevented? can animals and individuals be protected from its ravages? and can it be cured when it already exists? We here find numerous replies to these questions, all of great interest, all of great value, and many of great promise. It is further remarkable that so many different observers should be occupied with this question, and reach almost identical results by different methods. Among others the researches of Brieger and Fraenkel, Behring, Kitasato, Von Schweinitz, and Gray are especially worthy of notice.

Fraenkel (*Berliner Klin. Woch.*, 1890, No.

49), who is already known for work in this connection, for his determination of the nature of the filtered culture of the bacilli of diphtheria, tested a number of methods with the idea of determining immunity to the action of the diphtheritic poison, employing in the first place cultures of the bacilli attenuated in their virulence through the action of antiseptic substances and inoculations with the pure dried toxalbumen itself. These methods proving inefficacious, the toxalbumen was freed from organic germs by filtration or by heating to 55° C., and although he found that this procedure rendered animals less susceptible to inoculation with the bacillus of diphtheria, immunity was not conferred. Inoculation with large quantities of the bacillus culture liquid heated to 100° gave somewhat more satisfactory results, while when this bacillus culture liquid was exposed to a less temperature, about 65° to 75°, and then injected into guinea-pigs, the animals became slightly refractive to subsequent inoculations of the bacilli, provided two weeks was allowed to elapse between the injection of the culture and the inoculation with the bacilli. According to Fraenkel, the poisonous substance and the vaccine which confers the immunity, both of which are developed by the bacilli, are two distinct bodies, and he believes that the culture liquid, when employed as vaccine, at the temperature of 55° to 60°, weakens the action of the poisonous principle without affecting that of the vaccine; while the latter is destroyed by exposure to a higher temperature. Fraenkel thus has determined that it is possible to vaccinate against diphtheria, although his methods are of no therapeutic avail during the actual progress of the disease.

A decided step in advance has been reached through the reports of Drs. Behring and Kitasato, who, working in Koch's laboratory, announce results as to the production of immunity against diphtheria and tetanus, which would seem to establish beyond question the possibility of conferring absolute immunity against these two diseases, while they have also succeeded in curing animals suffering from diphtheria and tetanus (*Deut. Med. Woch.*, 1890, No. 49). The authors announce as the basis of this production of immunity that the immunity of rabbits and mice rendered refractory to tetanus depends upon the power which the blood possesses of rendering innocuous toxic substances manufactured by the bacilli of tetanus; and they find that the blood of rabbits rendered refractory to diphtheria possesses properties which enable it to destroy the poison of tetanus, and that these properties are located in the serum of the blood, a liquid deprived of all cellular structure. This property is permanent, and again reconfers immunity when transfused from animal to animal. Various methods were employed by these authors for rendering animals immune to diphtheria, and just as they found that the serum of the blood of protected animals destroys the poisonous principle of the tetanic bacilli; a similar method was found to govern the production of immunity from diphtheria. Certain animals, such as rabbits and mice, are naturally refractory to diphtheria, and may receive without harm injections of quantities of culture, which would inevitably prove fatal to much larger animals, such as guinea-pigs, rabbits, or sheep.

Dr. Behring describes four different methods through which the non-refractory animals may be vaccinated against diphtheria: 1. By the injection of bacillus cultures, which, after fourteen days, render guinea-pigs refractory to doses which would prove fatal to normal guinea-pigs. 2. The employment of trichloride of iodine added to an old culture in a preparation of 1 to 500. In these two methods it is the substance secreted by the bacilli, the living animal organism, which produces the immunity. 3. Immunity may also be produced by inoculating the products secreted by the bacilli in the living animal organism. For the purpose the authors used the pleural liquid collected from guinea-pigs dead from diphtheria. The inoculation of this exudation generally caused death; but when the animals survived they were then absolutely protected against diphtheria. A still fourth process consisted in inoculating animals with virulent cultures, and then controlling their deleterious action by appropriate therapeutic measures, a method the principle of which is the only one applicable to the treatment of this infectious disease in man. Dr. Behring found that there were a number of chemical substances, such as orochloride of sodium, naphthalin, trichloracetic acid, and phenic acid, which were capable of curing guinea-pigs affected with the poison, but the most active substance of all was the trichloride of iodine injected in one or two per cent. solution in amounts proportionate to the size of the animal. When the remedy and the poison were injected together, a circumscribed local inflammation was produced, followed by a slough,

virulent diphtheria bacilli remained in the ulcer which resulted, and which lasted usually for three weeks after the operation. When guinea-pigs so treated are entirely recovered, or only show a superficial ulceration, it then becomes absolutely impossible to reinfect them even with inoculations of such virulence as would destroy unprotected animals in thirty-six hours. In rabbits, the trichloride of iodine acts even better, but it still seems improbable that this remedy can be employed in human therapeutics. In the first place, it is extremely caustic, and in the next place it does not give such striking results when the infection has taken place by way of the larynx or the trachea. The action of this remedy is, without doubt, its power of destroying the soluble substance secreted by the bacilli. Finally, Dr. Behring has found that a great resistance to diphtheritic infection may be conferred on guinea-pigs through the action of peroxide of hydrogen. This preparation is employed in ten per cent. solution, slightly acidulated by sulphuric acid. It is in certain cases a very energetic disinfectant, and Dr. Behring entertains great hopes as to its value in the treatment of diphtheria in man. Unfortunately, however, this method must be employed before inoculation, as when administered after inoculation with the diphtheritic poison its action seems to aggravate the intensity of the disease.

Through Behringer's researches, thus, we have found that animals suffering from mild diphtheria may be cured; but, unfortunately, the results are not applicable to human medicine. Dr. Behring's observations, however, mark a distinct advance over any other point of view; for, in the case of the iodine trichloride, there is no question of the establishment in the organism of a tolerance either of the bacilli or of their poisonous products, or of the antagonism of one to the other, the immunity being due to the presence of a chemical compound having nothing to do with the disease.

In that the direction of study has been so clearly established, and has been already so fruitful of valuable results, it is not expecting too much, then, to believe that in the near future some such positive preventive of this disease, which will be applicable to man, may be looked for; and, in a recent note, published by Drs. von Schweinitz and Gray, the statement is made that a substance has been obtained which renders guinea-pigs treated with it insusceptible to diphtheria upon the subsequent injection of strong diphtheritic virus into the circulation of these animals, while the test guinea-pig within forty-eight hours after infection died. These authors state their belief that the results of the studies in which they are now engaged will be available for the prevention and control of diphtheria in man. They have not, however, published a detailed account of their studies.

THE PROTECTIVE VALUE AGAINST SMALL-POX OF KINE-POX VACCINATION.

THIS question has again come to the front in consequence of an investigation which has been for more than a year going on by the British Royal Commission and the recent publication of the third report of this Commission.

There is a small but influential and noisy minority of scientific men, with some few prominent physicians in England, who are disbelievers in the protective power of vaccine inoculations. On the continent the anti-vaccinationists constitute a league, with its head-quarters in Paris, which publishes much matter in tract form for general circulation, and in various ways foments a public sentiment against vaccination. In this country the movement has never assumed large proportions.

The arguments against variola vaccination are presented at great length in a work published, in 1889, by Edgar Cruikshanks,—a work which has been styled "a most important addition to the vast literature of vaccination,"—"The History and Pathology of Vaccination." Dr. Charles Creighton is the author of the notoriously one-sided article on vaccination in the "Encyclopædia Britannica," and a still more recent article in the *Arena*. Briefly, the contention is this: "Vaccine disease is not a form of small-pox at all; it has nothing to do with small-pox, . . . being a strictly local ailment; whereas small-pox is an eruption of pustules all over the body, attended by a fever, and spreading by contagion. What nonsense to advocate the prevention of small-pox by the inoculation of a merely local malady of the cow's udder, which has nothing in common with small-pox except a superficial likeness of name!" An appeal is made to instances innumerable of the failure of vaccination to protect against epidemics of small-pox (see the official figures of the epidemic of 1874 in Bavaria, a thoroughly well-vaccinated country, where, out

of 30,742 persons attacked by small-pox in one epidemic, no fewer than 29,429 were vaccinated, and among the 4884 who died of small-pox, 3994 were vaccinated).

The advocates of vaccination base their belief in its efficacy on the results of the past century, since Jenner first promulgated his views and his painstaking test experiments. They believe that the protective benefits of vaccination have been sufficiently proved by experience. Before Jennerian vaccination came into vogue small-pox was one of the most formidable scourges of the human race, causing a mortality of ten per cent. Since the general adoption of vaccination by civilized nations, the mortality from small pox has been reduced to a very inconsiderable figure (less than one per cent.). There have been epochs and places when, during the prevalence of small-pox, the enforcement of efficient vaccination regulations have been followed by a stamping out of the epidemic. Facts and figures to prove this are abundantly at the command of the vaccinationist, and they have been feebly met or ignored by the opponents of vaccination.

Another line of argument, based on incontrovertible facts, has been especially convincing to the unprejudiced, and cannot be easily met by the men with the antivaccination bias. Side by side in a nation you may have one set of people who have been poorly or not at all protected by vaccination, and among these the small-pox will rage with great fatality, and another set, all of whose members shall have been the subjects of enforced vaccination, and scarcely one of the latter shall be touched by the epidemic. This was the case with the Prussian army during the small-pox epidemic, which, from 1857 to 1861, spread over all Germany, and caused among the civil population nearly eight thousand deaths. The mortality in the army, where vaccination and revaccination had been rigidly enforced, was practically *nil.** This seems to be a sort of test experiment on a large scale, for camp and barrack life has generally furnished excellent conditions for the spread of small-pox. Bouley† affirms that "the same results may be observed to-day in our [the French] army. Since revaccinations have been practised there with great regularity, and since care has been taken to procure by a revaccination of urgency, the immunity of soldiers in all localities where small-pox rages among the civil population, the contrast is strikingly and absolutely demonstrative, . . . the mortality among the military being almost nothing." A contrast of a similar kind is alluded to by Bouley between the mortality from small-pox during the Franco-Prussian war, of the French army (unvaccinated) and the German army, where vaccination had been made obligatory.

We have no space for the elaborate statistics compiled several years ago by Dr. Martin, of Roxbury, showing the average annual mortality from small-pox among the different nations of Europe for various decades before and since the introduction of vaccine. Thus, in one department—that of the province of Trieste—the deaths from small-pox alone were 14,000 per 1,000,000 of inhabitants during the period of thirty years just before the introduction of vaccine, and only 182 during the period of forty-two years which followed the practice of vaccination!

To statistics of this kind the antivaccinationists oppose the failures of vaccination, and never in any instance hint at the possibility that these failures to protect (which admittedly have been sufficiently numerous) were owing to the bad quality of the vaccine matter employed. Every physician who has been in active practice during the last forty years well knows to what those failures may be attributed. He remembers the time when he himself saw reason to lose faith in the Jennerian vaccine, transmitted from arm to arm for countless generations, till, by the feebleness and want of typical characters of the local and general reaction, it seemed to him to have become literally an "attenuated vaccine." He remembers well his own frequent mistakes in using dried scabs for vaccine matter (taken from the arm of some patient) instead of the clear lymph, which oozes from the primary vesicle about the seventh day, and admits that in some instances he may have communicated to his patient by the employment of these crusts a mild form of septicæmia instead of the cow-pox disease. He admits also the possibility that in rare cases (as the antivaccinationists affirm) "humors," even syphilis, may have been imparted through the use of faulty (humanized) vaccine. All this, however, the physician of forty years or more of experience in vaccination attributes to ignorance; and his faith in the almost absolute prophylactic efficacy of animal vaccine of a pure quality (the pure watery lymph of the primary vesicle, dev-

* Leon Collin, "Traité des Maladies Épidémiques."

† "Le Progrès en Médecine par l'Expérimentation," p. 261.

of all admixture with blood or pus) receives confirmation every day.

In reading the recent writings of the leading antivaccinationists (Cruikshanks, Wallace, Collins, Picton, Creighton), we have been struck by the utter lack of appreciation of all that has been contributed to science during the past twenty-five years respecting the comparative pathology of infectious diseases, the nature of virus, of attenuated virus, etc. Considering the modifications which virus often undergoes in the animal economy and the more powerful resistance and reaction which the animal often presents to the infectious agent, transplanted by inoculation from the human subject (in some animals, for example, all attempts to inoculate tuberculosis fail, and most animals prove refractory to syphilis), it would not be beyond the *possibilities* that the vaccine disease *may be* a modification of small-pox; although Charles Creighton declares that it would shatter any man's scientific reputation to affirm it. We regard the latter and all the clique which he represents as equally rash and foolhardy in their reiterated declarations (based on nothing but assumption) that there is *no* identity, consanguinity, or likeness between variola and vaccine; we ourselves are content to remain in a state of suspended judgment on that point, though satisfied that the findings of the Lyonese Commission cannot be regarded as the final word on that subject.

Since the above was written our attention has been called to some new researches on variola vaccine, which, if they shall be confirmed, will settle the contention forever by establishing the unicity of cow-pox and small-pox. Haccius, director of the Vaccinal Institute of Geneva, and Eternod, Professor of Histology in the Geneva School, following the operative method of Fischer, as described in the *München Medicinische Wochenschrift* last year, claim that they have succeeded in imparting small-pox to animals, and in transmitting it through several generations, the disease eventually manifesting itself in a mild form, indistinguishable from true cow-pox, and, like the latter, conferring immunity from variola.

"Believing that the method of inoculation by pricks and incisions, practised by the Lyons Commission, was insufficient, and that experiments based upon this method were inconclusive, these later experimenters have resorted to a method that they call *vaccination on surface, or vaccination by denudation.* They denude the skin of the animal over an extent of several square centimetres by means of a thin glass scraper. . . . Then they rub the denuded surface with a spatula charged with the small-pox virus. They assert that by this procedure they have never failed to obtain success, while the method of pricks and incisions is very apt to fail."

The first products of this method of vaccination appear to have been a local eruption of papules of little typical character, "abortive," like those "which led the Lyonese Commission into error." If from the product of these papules another series of inoculations be practised, and a third from the second, "the pustulation tends to become typical by taking on more and more the mode of evolution and characters of the vaccinal eruption." After the third generation the pustules "cannot be distinguished from those obtained in the vaccinal institutes by the inoculation in the first generation of spontaneous cow-pox."*

Among the conclusions stated by these experimenters is the one which, if established, must henceforth silence all cavils and objections,—that "small-pox, inoculated in the heifer, becomes transformed into vaccine in the course of several generations by transmission through this animal. Duality is thus disproved."

THE TREATMENT OF LUPUS BY KOCH'S METHOD.

THE surgeons of a past age were well acquainted with the anatomical features and pathological results of lupus; thus we find in "Cooper's Surgical Dictionary," published in 1802, this description: He calls lupus by the name now gone out of vogue, *Noli me tangere*, and defines it (substantially) as a slow tubercular affection, occurring commonly about the face, having a tendency to end in ragged ulcerations of the cheeks, forehead, eyelids, and lips, and sometimes appearing in other parts of the body, where it gradually destroys the skin and muscular parts to a considerable depth. The disease is said "to begin in small tubercles, which change after a time into superficial spreading ulcerations more or less concealed beneath furfuraceous scabs."

The true nature of tubercle long remained in obscurity. It was regarded as scrofulous, then as syphilitic; good authorities took the

* *Boston Med. and Surg. Journ.*, January 22, 1891.

view that it was invariably of syphilitic origin. Thus, Dr. Clement Lucas, writing in the London *Lancet* in 1879, says, "It is not too much to affirm that nearly every case of extensive ulceration of the face, to which the term *exedens* might with good reason be applied, has its origin in syphilis. Erasmus Wilson, in his "Diseases of the Skin" (1860), favors this view.

Friedlander and Koster were among the first to show the morphological identity of lupus with tuberculosis, and Koch's subsequent discovery of the bacillus tuberculosis in lupous tissue, and the striking experiments of Schüller and Huber seem to have established the tuberculous nature of lupus beyond cavil or question. The arguments for this view are well stated in the article by Neisser, "On Chronic Infectious Diseases of the Skin," in Ziemssen's "Hand-Book of Diseases of the Skin."

If we were to sum up the history and course of lupus from its inception, we might say that the doctrine now held is that there is first penetration of the derm by Koch's bacillus. The bacillus acts first on the walls of the blood-vessels of the part producing that damaged state which is the anatomical substratum of inflammation; there is a migration of leucocytes into the meshes of the surrounding connective tissue. The irritation of the bacillus causes these migrating corpuscles to assume a variety of developmental forms, chief among which are those known as "giant cells." The agglomeration of these exudation cells constitutes the tubercle. Delicate blood-vessels permeate the tumor; these soon become choked out by the luxuriance of the growth, and there is caseation (by starvation) in the centre; this was the older view. It is now taught that the caseation is a coagulation-necrosis, caused by the poisonous character of products engendered by the bacillus itself. While the growth dies at the centre, it extends peripherally, and simultaneously the necrobiosis spreads, and thus we have the characteristic feature of this disease,—"formation and disintegration of the nodules under the influence of a virus, spreading into the periphery." As the nodular masses all perish one after another, "not only the first attacked portion of tissue is destroyed, but likewise its surroundings, which coalesce with the new formation, both in width and depth, and perish" (Neisser).

Hebra has greatly simplified the nomenclature of lupus by showing that the many varieties described by authors under the terms tumidus, exedens, non-exedens, exuberens, rodens, exulcerens, exfoliativus, fungosus, serpiginosus, etc., "are all simply differences in the stage, position, or mode of development of the same disease," which he calls lupus vulgaris.*

Koch's remedy, concerning which so much talk is now being made, is stated by him to be a glycerin extract, derived from the pure cultivation of tubercle bacilli. According to his explanation, this extract, when injected into the system, precipitates in the environment of the tuberculous nodules the changes which are effected in the centre of the nodules under the influence of the bacilli themselves, a coagulation-necrosis, which stops the further spread of the tuberculous growth.

"The tubercle bacilli produced when growing in living tissues, as in artificial cultivations, contain certain substances, which variously and notably unfavorably influence living elements in their vicinity. Among these is a substance which, in a certain degree of concentration, kills or so alters living protoplasm that it passes into a condition that Weigert describes as coagulation-necrosis. In tissue thus become necrotic, the bacillus finds such unfavorable conditions of nourishment that it can grow no more, and sometimes dies."

In other words, that which is a natural effect of the bacillus when developing in a tissue, stopping short of completeness owing to the existence of new breeding-soil for the bacillus at the periphery of the nodule, Koch attempts to reinforce and heighten by artificially increasing the amount of necrotizing substance in the vicinity of the bacillus, thus destroying the conditions of nutrition for the bacillus.

As for the results of this new treatment, it is still too early to pronounce definitely. Numerous cases of lupus so treated are reported as cured; in others, marked ameliora-

* "Since Willan and Bateman at the beginning of the century attempted to restrict the term lupus to particular ulcerations about the face, an almost innumerable series of varieties have by various writers been described, and many divisions have been suggested, according to the stage or condition of the lupous process. But the division which has taken most hold on the profession is that of Rayer into *lupus exedens* and *lupus non-exedens*. This was generally accepted by the profession, and became the basis of clinical teaching. Against the continuance of these terms I wish most emphatically to protest, and I trust that they may soon be considered as much out of date as the still older *noli me tangere*. Apart from their general awkwardness, they simply express stages of a process, or differences in the rate of progress of the disease."—R. Clement Lucas, in London *Lancet* (American reprint), 1879, p. 289.

tion has been noted. Will the benefit be permanent? We must wait and see. Perhaps the estimate of Kaposi (who is so good an authority on lupus and allied destructive formations) may be taken as fairly representing the present status of science on this question.

At the recent meeting of the Imperial and Royal Society of Vienna, Kaposi reported that he had subjected in all thirty-two patients to this treatment. These patients had now remained under observation about six weeks. He presented at the meeting six cases, which were apparently cured; the skin was everywhere smooth; nowhere was tubercle or ulceration perceptible. He has found that at the end of a certain time the extract produced by the bacillus (Koch's *mittel*) no longer acts in small doses, the dose must be augmented. In a certain proportion of his cases he interrupted the treatment for several weeks; then he recommenced with small doses, on the supposition that the bacilli had acquired a new vitality. He invariably found that there was a new reaction to the injections, as if the bacilli had only been overcome for the time,—driven into latency, not destroyed. In some of these patients the interruption was actually followed after a time by a reawakening of morbid action at the seat of the lupus and by the formation, in some instances, of new foci of disease. "We turn," he says, "in a vicious circle. On the one hand, we exercise a favorable action on the lupus by means of the injections; on the other, the interruption enables the lupus to continue its development, and as the bacilli cannot be eliminated from the tissues, they may penetrate the lymphatic ducts and provoke metastasis. The problem, then, is, how to favor the elimination of the bacilli. The thermo-cautery and the cutting curette will remain indispensable in the future." Kaposi might, perhaps, have added the arsenical paste, so popular with the old surgeons, and so often successful under careful management.

At the same meeting, Billroth mentioned the case of a lupus patient who had lately been sent to his surgical clinic to have the operation of rhinoplasty performed. He was supposed to be well, but the upper lip was still hard and infiltrated. This infiltration disappeared after several injections. In this patient an interruption of twelve days was made in the treatment; then a moderate dose was injected, and the reaction was intense. Afterwards an injection of 15 centigrammes was made, and there was no reaction. In another case of lupus, there was an extremely violent reaction. During an interruption of a fortnight, the lupous lesions again broke out, being in full efflorescence.

The above shows the uncertainty in which the profession must for some time remain as to the permanently curative benefit of Koch's remedy in external tuberculosis, however striking may be the immediate amelioration.

Jonathan Hutchinson has lately concluded a series of interesting lectures on the "Nature and Treatment of Lupus" (*Lancet*, January 17, 24, 31). His views are not precisely those above stated. He contends that lupus processes of inflammation originate in persons who are locally or constitutionally of feeble cell-nutrition and prone to vascular disturbance. That a parasitic bacillus attends many of them is to be freely admitted; that its implantation constitutes the initial stage of lupus he gravely doubts.

He accepts the word lupus as the family name of a variety of maladies known as rhino-scleroma, lymphangeioma pigmentosum, lupus erythematosus, lupus vulgaris, scrofulo-dermata, etc., which all have these features in common. They attack chiefly those parts of the surface of the body which are exposed to the influence of cold and irritants, and they occur by preference in those who are by inheritance or acquisition of feeble organization, and who are proved to be in greater or less degree liable to the attacks of the tubercle bacillus. They are all developed most commonly in the period of adolescence. They are all infective in their local qualities, and continue to spread slowly for an indefinite number of years; and it is possible in every one of them that, after prolonged duration as a non-malignant chronic inflammation, a tendency to cancer may be shown. Every one of them disorganizes the tissues which have been affected by it, and leaves behind it a scar. Concerning almost all of them, it is freely admitted that syphilis may produce very close simulations, and at the same time it is denied that their type forms have any connection, remote or otherwise, with such taint. With the exception of only the most erythematous forms of erythematous lupus, destruction by local measures of the infective material is required in every case, and without any exceptions at all, attention to the general health by the use of a liberally tonic regimen is requisite, together with the protection of the parts from all external irritation, and more especially from cold.

Among the local measures of treatment he gives his preference to the actual cautery and the acid nitrate of mercury. He speaks favorably of erosion by Volckmann's scoops. Instead of Dupuytren's (arsenical) paste, he uses the liquor arsenicalis, which may be painted on with a camel's-hair pencil. Undiluted carbolic acid is very efficient, and if the patient be intelligent, he may be trusted to make the applications.

With regard to Koch's treatment, he is very guarded in pronouncing an opinion. The cases which appear to derive the greatest benefit are those in which there is most of inflammatory swelling, and in which the more specialized elements of the lupus process are least abundant. In lupus erythematosus, the injections seem to have failed. They have not yet, he says, been tried in cases of perfectly quiet lupus,—*i.e.*, single-patch lupus occurring on the cheeks of healthy persons, characterized by a thick growth of "apple-jelly," and by the entire absence of any surrounding inflammation. He believes that such cases would not be benefited by the treatment. We are obliged, he says, to report that nothing that can be called a cure of lupus by the new treatment has yet been obtained in London practice. The patient, who was taken to Berlin by Mr. Malcolm Morris and Dr. Pringle, and was for a time supposed to be almost cured, is now said to be in a condition almost as bad as before the treatment. From all quarters we hear of relapses occurring quickly.

It may be, however, that in the future this method of treatment may be put to some use, especially if combined with the older methods of destruction of the lupus deposit by means of cautery or caustic. The ill effects of the treatment on the general health soon seem to pass away. When febrile reaction ceases to occur, it seems evident that there is no longer hope that the lupus nodules will be attacked.

TREATMENT OF TUBERCULOSIS BY TRANSFUSION OF BLOOD FROM AN ANIMAL REFRACTORY TO TUBERCULAR INFECTION.

FOLLOWING the example of Koch, numerous bacteriologists have endeavored to so modify cultures of the tubercular bacillus as to obtain a vaccine which would be efficacious in the tubercular process. An entirely new point of view has, however, been reached in the line of study opened by Drs. Richet and Hèricourt, who have endeavored to confer on an animal liable to tuberculosis a more or less marked degree of immunity to tubercular infection by the transfusion or introduction into the economy of the blood of an animal refractory to tuberculosis. The results of these experiments were announced at a recent meeting of the Société de Biologie (*Gazette Médicale de Paris*, January 24, 1891).

These authors claim that the transfusion into rabbits of the blood of the dog, or, even better, the peritoneal infusion, which permits of much larger amounts being employed, attenuates and retards in these latter animals the evolution of tuberculosis, and that this can again be rendered more intense and more manifest by removing blood from a dog which had previously been inoculated with a certain quantity of very active tubercular virus. The authors appear to have employed no such line of experimentation on man, although they claim that they intend to carry out such a line of study, as, if conducted with prudence, it is free from danger. Among the animals refractory to tuberculosis, whose blood may be utilized in this method of treatment, are the dog and the goat, and the statement is made that Dr. Lépine has already injected from 1½ drachms to 3 ounces of the blood of a goat into the cellular tissues of patients affected with tuberculosis without noting any local or general action, with the exception that in two cases there was slight painful swelling at the seat of injection, which lasted for one or two days. An important addition to this observation is the statement of Lépine that it is not necessary to inject the entire blood, but that the serum is quite as efficacious. It is evident that, if this is a fact, one serious source of danger is avoided, for, as is well known, the transfusion of blood of one species of animal into the veins of another is apt to lead to the destruction of the red corpuscles, and the production of hæmoglobinuria and other serious accidents; and the statement is made that Drs. Richet, Lépine, and others have injected subcutaneously into tuberculous patients, with perfect harmlessness, 15 to 30 drops of the serum of the dog.

This experience has been repeated apparently sufficiently often to prove its entire freedom from danger. Its therapeutic value is not, however, so clearly established; for, in the first place, admitting the value of the statement that the blood of an animal refractory to tuberculosis might give immunity to tuberculosis, the question is, what animal

should be selected, since, as is well known, the immunity of the dog to tuberculosis is only relative? and at the meeting of the Société de Biologie, January 17, 1891, Dr. Roget showed specimens from a dog dying from pulmonary tuberculosis. The pleura of the animal was considerably thickened, and in the lungs there was a small caseous pneumonic nodule containing micro-organisms which gave the same reactions as the tubercular bacilli, although more slender and longer than those found in man. This dog had been infected with tubercular meat. Dr. Richet's method of preparing the serum of a dog is to place a canula in the carotid (*La Médecine Moderne*, January 22, 1891), and then collect the blood in a sterilized bulb, in which it is allowed to coagulate. When the serum separates, it may be readily collected by means of sterilized glass tubes, whose extremities are then sealed hermetically. The authors state that they have performed seventy-five injections without ever having the slightest accident of any kind.

Lépine, however, has shown experimentally that this immunity is enjoyed to a greater degree by the goat, and he announces that he is now conducting a series of experiments, whose results he promises shortly to publish.

Reports on Therapeutic Progress.

A CRITICAL STUDY OF KOCH'S CURE FOR TUBERCULOSIS.

PROFESSOR SEMMOLA publishes in the *Internationale Klinische Rundschau* for January 4 and 11, 1891, a criticism of Koch's method of treating tuberculosis, which may perhaps, now that the wild enthusiasm has somewhat abated, receive the attention which the author's reputation as a careful clinician warrants. We do not pretend to endorse all Professor Semmola's views, but we cannot but believe that much would have been avoided had his beliefs been more generally held.

"In the midst of the universal enthusiasm aroused by the discovery of Robert Koch, it may seem strange and presumptuous if I venture to express very grave doubts respecting the therapeutic value of Koch's cure for tuberculosis, my judgment being based upon clinical observation and upon the incontrovertible data of rational therapy. Months, perhaps years, will pass,—unfortunately no mortal can measure the duration of such sad delusions and fashions, especially in the province of medicine,—but the truth will at last prevail.

"When it shall have been the special purpose of one's life, during a long series of years, as it has been of mine, to harmonize the disclosures of the laboratory with the results of clinical therapeutics, it will be seen that by depending on that strong experimental logic which should always guide the biologist, as well as the physician, in the laboratory or at the sick-bed, I have been rendered unable, to my great regret, to participate in the universal enthusiasm, despite my high esteem for the great Berlin investigator.

"When, in the year 1880, the investigations of Pasteur were made public, respecting the immunity achieved by inoculation of diluted virus, I was very sceptical as to the value which Pasteur placed upon the utilization of his method in practice.

"I forbear any reference to the comical aspect of the question. The pen of a Molière would be needed to portray this 'progress' in modern medicine, representing a man in sound health, who, for the purpose of obtaining assured immunity from the virulent germs of the external world, subjects himself to a series of antidiphtheritic, antityphus, antiscarlatinous preventive inoculations, thus producing in himself a series of artificial diseases.

"For my part, I must openly confess that I fail to see this remarkable progress, and it seems pertinent to ask whether all these attenuated poisons, introduced successively into the organism, would possess the same preventive power as if only a single one were employed for inoculation.

"Naturally, if such progress were possible, a much smaller number of people would be carried off by death, and the conditions of existence would be withdrawn from a large number of the lower or invisible forms of life,—a contingency for which scarcely any one would grieve, as men would thus be less tormented by microscopical parasites, although the latter, on the whole, are the least dangerous.

"But the sad consequence would be that our planet would soon become overpeopled, and the social problem, which to-day is the subject of lively discussion, would grow more grave and terrible in character, for the danger would arise that men, liberated from the invisible parasites by the progress of medicine, would become all the more the prey of the macroscopic parasites, against which, un-

happily, there are no preventive inoculations. Then there would prevail a veritable moral anthropophagy, with all its consequences!

"On the occasion of my visit to London, during the meeting of the International Medical Congress, in August, 1881, I took part in the *fête* given by Lord Granville in honor of the members of the Congress. I was there a witness of the boundless joy with which the mothers present greeted the promises of Pasteur, placing in early prospect a future when, thanks to preventive inoculations, infective diseases, such as scarlet fever, diphtheria, etc., would lose their dangerous character. Though it caused me pain to rob them of their illusions, I could not help declaring straightway, what I had often said and written,—namely, that those promises were the phantasies of a man who, unfortunately, is no physician, and accordingly not in position to comprehend the wide chasm which separates the laboratory of the biologist from the clinic. My views were justified by the facts, for these hopes continue to remain dreams.

"The praiseworthy zeal with which a large number of chosen spirits have followed the example of Pasteur has undoubtedly been crowned by brilliant triumphs in the current progress of biological methods; I must, however, declare that these triumphs, in their practical application to man for the prevention and cure of virulent and contagious disease, have proven worthless, and will so continue in the future. The cause is very simple:

"The impetus given to these investigations and expectations proceeded from an error in natural philosophy or experimental logic; accordingly, 'False premises, false consequences.' In truth, all these investigators were animated in their labors by the fundamental idea that Jenner's vaccination is a wonderful instance of immunity from small-pox, obtained by means of the inoculation of the virus of cow-pox, which, in their judgment, represented the small-pox poison attenuated in passing through the organism of the cow.

"This example, however, has nothing in common with the artificially-produced vaccines of Pasteur and his associates. I was always of the opinion, and still believe, that there is a great difference between these two things, and to those who believe differently I would here remark, that experiments and discussions have been going on for forty years, with the most contradictory results, and that thus far no conclusions have been accepted. We may therefore well ask whether sound experimental logic will permit us to proceed from the unknown and to make a leap into the future.

"Had I busied myself with these studies, I should have pursued a different course. First of all, I should have determined whether Jenner's vaccine really represented the attenuated virus of small-pox, and only after determining this would I have concerned myself further with the various other virus dilutions. But my experimental logic would not have made a halt here.

"I cannot admit that it is all one whether we obtain the dilutions of a virus through its introduction into the organism of another animal species, or through physical and chemical means, such as all the experimentalists have employed during the past ten years. *In this procedure I see a serious violation of the experimental method*, and until proofs of the contrary shall be adduced, I shall cling to the belief that it is one thing to dilute a virus in the living body and a very different thing to attenuate it by hydrochloric acid or heat. I have repeatedly pointed out that just such deviations from the experimental method are the cause of certain absurdities in contemporary medicine, which possess the appearance of earnest and precious acquisitions.

"Not only this error in experimental logic, but a further and not less serious illusion is to be observed.

"The vaccine of Jenner (which in reality is an unknown thing) is given to a healthy man in order to render his organism capable of resisting small-pox, or, in modern parlance, to render him immune from the development of the variola germs. But, I ask, what has this form of immunity or non-receptiveness to do with that other form which we wish to impart to the organism already diseased? and as such we must doubtless look upon an organism in which the poison already circulates (for example, after the bite of a mad dog). The thought of these alleged discoveries, which not long ago filled the whole world with enthusiasm, comes to me like a dream. Truly, if the 'progress' fever so intoxicates our senses, so blinds us, that we renounce the principles and the fundaments of the experimental method, and no longer distinguish white from black in the various experiments, arbitrarily modifying the conditions of the phenomena, and, in the name of experimental medicine, deducing more bane-

conclusions than can be charged to the old-time empiricism, I would earnestly implore that a halt be made! In the face of this feverish haste, I recommend that we turn about, and again traverse the path of this so-called progress of the last decade with the illuminating torch of that severe scientific logic which has guided so many great minds (especially at the beginning of this century) to the discovery of immortal truths, which then formed the basis of current progress in medicine.

"What analogy, I ask again, is to be found between the first and second form of immunity? Is it possible to believe that an organism into which the morbid poison has already penetrated calmly waits for the prophylactic or curative effect of the attenuated virus? I do not believe it at all, but must rather assume that as soon as a virus from without secures lodgement in the body, the chemico-biological relations of this organism are modified every minute, every hour, every day. Thus is inaugurated that slow, dystrophic activity which so disturbs metamorphosis that at a given moment the outburst of the clinical form peculiar to that virus must inexorably follow. In the present case, hydrophobia would inevitably develop. We know that a single drop of water is sufficient to cause the overflow of a liquid. This statement is an incontrovertible truth, acquired through the effective progress of physiology and general pathology.

"I cannot comprehend how true clinicians can believe in the practical value of the preventive or curative effects of attenuated disease-poisons, the virtue of which has been established solely in the laboratory; such is their belief, if the doctrine in question has once been established on hypothetical bases!

"The basis of my conclusions has been the investigations of Pasteur, not because Koch's liquid is an attenuated virus, but because the labors of Pasteur prepared the field for the investigations of Koch. Even now, if the 'lymph' of Koch, which is said to be a certain remedy for tuberculous affections, must be regarded as a further confirmation of the mighty impulse given by the labors of the laboratory, it nevertheless presents to the eye of the unprejudiced physician the same deficiencies, if not greater ones, as the other conclusions deduced from animal experiments and applied straightway to human beings.

"At this point I ought to discuss the reality of the primary claims made for the Koch 'lymph,'—that is, its alleged specific elective action on the tuberculous tissue. According to Koch's own reports, this elective specific action upon the tubercle is not to be questioned, for it is not to be assumed that an investigator like Koch would have made such a claim without being assured of his case and without having irrefutable proofs in hand. I will, therefore, not enter into a further discussion of this preliminary claim. I will also refrain from questioning whether this action is really to be regarded as an elective biochemical one, or only as a curative effect of the general hyperthermia and local hyperæmia which usually follow the injection of the Koch liquid. In truth, the clinic can report many instances of the cure of several local disease processes and hyperthermic influences, which accompany acute transitory disease. These curative effects, however, appeared to be as inscrutable as they are unstable, and accordingly may lay no claim to the designation of cures.

"I will even assume as true and firmly established this destructive influence upon tuberculous tissue. But, in order to cure tuberculosis of the lungs, we must, above all things, influence and heal the pretuberculous stage. The Koch 'lymph' cannot, and never could, exercise any modifying influence upon that deep-seated alteration of metamorphosis which leads slowly, and often only after the lapse of many years, to the tuberculization of the organism. This anatomical, pathological, and clinical knowledge with respect to tuberculosis, in connection with the special biological action of the Koch 'lymph,' afforded my chief grounds for denying to the discovery of Koch any success as a cure for tuberculosis of the lungs. I have, accordingly, not hesitated to openly express my opinion as a physician at a time when a foolish infatuation possessed the entire world.

"How could so many prominent physicians become enthusiastic over this supposed antituberculous remedy, inasmuch as the Koch 'lymph,' at the best, was incapable of removing the last anatomical consequences in a consumptive?

"All the more singular and incredible appears the joy of those who cling to the bacillary origin of tuberculosis, inasmuch as Koch's remedy cannot destroy the bacillus. I can, therefore, not refrain from mentioning that the enthusiasm of these gentlemen involves a peculiar contradiction, since they admit the possibility of a cure by means of a substance which does not kill the Koch bacillus.

"Whether adhering to the old or the new

pathogenic doctrine respecting tuberculosis, we cannot escape this dilemma. In order to cure tuberculosis we must either render the propagating soil (organism) unfit for the development of the tuberculous germ, or we must kill the bacillus itself. The Koch 'lymph,' however, is incapable of accomplishing either the one or the other. This conclusion must force itself upon the most blinded, if they are true physicians and investigators. Koch has himself declared that the 'lymph' is not capable of destroying the bacillus, and further words on this subject would seem superfluous. It would also be idle to speak of the heart-rending struggles of the tubercular bacilli, as they have been described by several observers, for, as Cornil properly remarks, these effects of the Koch remedy on the bacilli are creatures of phantasy.

"There accordingly remains to be mentioned only the action of the Koch 'lymph' upon the propagating soil (organism); that is, upon the organic disposition (whose nature is unknown to us) upon which the bacillus may thrive. The well-founded conjectures respecting the chemical nature of the Koch 'lymph,' as well as our previous knowledge of its biological effects, are more than sufficient to impart the conviction that, in view of the laws of experimental pharmacology and clinical therapy, the 'lymph' cannot possess the property of producing in the organic disposition to which we have referred the necessary beneficent modifications; and only a momentary forgetfulness of these principles has occasioned illustrious clinicians to greet this questionable discovery with enthusiasm. On the basis of the foregoing, I considered myself justified, a month ago, in delivering an unfavorable judgment upon the possibility of curing tuberculosis of the lungs with Koch's remedy. My judgment, thus respectfully expressed, aroused an echo that surpassed my modest expectations, for it was telegraphed to all parts of the world. I must assume that this unusual and unsought for publicity is to be ascribed altogether to the dangerous character of the disease which it was hoped to cure, and had no reference to my personality; for I could lay claim to nothing more than the rather bitter service of having possessed the courage to express my adverse opinions at the moment when the world was all applause. But, perhaps the expression of my own judgment on this subject was a treason? Is our freedom of thought to be prohibited when one has the fortune or misfortune of seeing what others do not see? Or, has Filicaia's utterance with respect to Italy remained true,—'Thy destiny is to remain ever a slave, whether conquered or victorious!'? Unworthy insinuations, open insults, and denunciations have been heaped upon me in the interval.

"But enough of these contemptible matters. Let us return to an unprejudiced scientific discussion, in order to see how it is that the biological action of the Koch 'lymph' does not permit our attributing to it the power of so modifying the biochemical constitution of the organism that it will lose the power of propagating the tubercular bacillus. The specific elective action of the 'lymph' is said, as is well known, to be directed against the tuberculous tissue, destroying by a special process (to discuss which in a scientific manner I look upon as altogether premature) all, even the most remote, tubercular gatherings, wherever they may be found in the lung. As I have indicated in the foregoing, this destruction cannot be regarded as equivalent to the cure of tuberculosis of the lungs, for after the destruction of the morbid tissue in one case, under the influence of the generally morbid condition, which remains unchanged, and of the bacilli which are not destroyed, other morbid tissue would be formed. Accordingly, looked upon from this point of view, the action of the Koch 'lymph' can never be regarded as equivalent to cure.

"In view of these principles,—as certain as mathematical demonstration,—it is only to be wondered at that any physician of scientific culture can persist in his enthusiasm after Koch's official report of the 13th of November last. I must assume that a very natural eagerness to liberate humanity from the terrible scourge of tuberculosis was so passionate and irresistible that it overcame the protests of sober reason; or, on the other hand, it must be assumed that Koch's 'lymph,' though failing to destroy the bacillus, possesses a biological action which modifies the organic conditions favorable to the reception of tuberculosis; so that in a measure it would seem as if Koch meant just this when he declared that he believed his 'lymph' to be a certain remedy for the cure of the initial stage of consumption. But, in all truthfulness, what is meant by the initial stage? What clinician, however distinguished, if he would be conscientious in his work, will venture to set exact boundaries to the evil?

"In the most charitable of interpretation

we must accordingly reach the assumption that Koch's 'lymph' possesses the power of curing that terrible degeneration of the organism which affords an entrance to tuberculosis. In my judgment it would be simply a sign of great innocence to lull one's self with earnest hopes in this respect, for the form and manner in which the biological action of the Koch 'lymph' is developed does not admit the assumption that it possesses that slow and specific biochemical action on metabolism which is requisite in order to produce a radical modification in those slow and characteristic abnormal processes of metamorphosis which precede the formation of the tubercle.

"Such slow modifications of metamorphosis can in general be effected only by long-continued hygienic influences, or through certain mineral medicaments, such as mercury, iodine, and others, which, by means of an unknown chemico-mechanical action,—perhaps, as a result of the combinations which they form with the albuminoids,—prove compatible with the life of the organism on the one hand, without causing any visible disturbance; and, on the other hand, if their application be long continued, unnoticeably modify the direction of the nutritive function, so that, as a final result, cure of syphilis, scrofula, etc., takes place. But let it be noted that this special biological action is vested in mineral remedies alone, which, administered in moderate therapeutic doses, possess the property of long remaining in the organism, during which period they modify the cell-functions through chemical processes which are brought to bear on the new nutrients coming from the external world, without ever producing toxic phenomena. If such phenomena appear, the treatment must be terminated or retarded.

"Accordingly, for the purposes of scientific pharmacology and rational therapy, the toxic action, in the true sense of the word, stands in contrast to the property of a medicament which is supposed to possess curative power, and which is intended to modify continuously and permanently the nutritive activities of the sick organism. I should not be able to harmonize these two modes of action without setting up a pharmacological paradox. The reason is very simple. A substance which, in order to exercise this modifying power in the manner indicated, must produce toxic symptoms after each administration, cannot pass muster in my eyes as a curative agent; during weeks and months it would incessantly expose the organism to the dangers of repeated poisoning,—every day, every second day, etc.

"The conclusion is clear, and for this reason the slow modification of metamorphosis must remain the exclusive property of mineral medicaments, for, as stated, they are the only ones which, partly through chemical combinations, which they form even in small doses, partly because the organism will readily tolerate these doses for months without poisonous symptoms, will yield the physician in certain chronic diseases the most brilliant curative results.

"This mode of therapeutic action will never be achieved by organic medicaments, least of all by alkaloids, because, instead of acting from the very beginning through the biochemical mechanism peculiar to the mineral medicaments on the activities of metamorphosis, they reach the histological, muscular, nerve, or gland elements, producing at once more or less severe disturbances of function. Precisely these local disturbances of function produce in the general nutrition profound modifications as soon as they reach the degree of toxicity, and in this case they cannot possibly accord with health and life.

"When, however, these local disturbances of function, on account of which the various alkaloids form veritable elective reagents for the various tissues, are so slight that the functional modification is inappreciable and passes unobserved, the application of the remedy may be continued for months and years unfelt by the living organism. Morphine in therapeutic doses produces stupor and sleep. However, if instead of injecting 1 centigramme, ¼ milligramme be injected, the employment of the remedy may be continued for months, and the subject will not notice it. The same is true of strychnine, and even of the most poisonous alkaloids, such as aconitine, cicutine, etc. Naturally the relation between the degree of toxic action and of tolerable therapeutic dose must be borne in mind.

"The inference is clear and distinct that the mechanism through which the alkaloids can modify all the activities of metamorphosis is fundamentally different from that through which they are modified by medicaments of mineral origin. The action of the latter is primary and incessant, and does not require toxicity in order to achieve wonderful curative results, as may be seen in the employment of iodine, quicksilver, and arsenic.

"The alkaloids, on the other hand, produce in homœopathic doses no appreciable effect, or possess only a transient action in therapeutic doses, or, finally, in toxic doses, they may become dangerous. Under all circumstances, however, they develop a *primarily local* action upon several cell elements, which then becomes general; at the same time metamorphosis undergoes modification when the action upon one or the other nerve or gland function has reached that degree which does *not* longer accord with the normal, harmonious solidarity of all the functions.

"As great as may be the secrecy observed respecting the production of the Koch remedy, it is certain, from the chemical analyses thus far made, that it does not contain metallic salts, and that, in view of its phenomenally toxic action, it must contain a ptomaïne or toxalbumin,—namely, one of those principles formed under the influence of bacteria, which, in recent years, have opened new vistas for pathology.

"In connection with the foregoing, I feel called upon to pay to Robert Koch my tribute of applause, since he has succeeded by dint of systematic and painstaking labor in discovering a new toxic principle, which surpasses in energy all similar substances thus far known. By this discovery he furnishes a new and classic proof of the already great significance of the discovery of ptomaïnes, which serve to illumine the clinical tableau and the character of many acute infectious diseases.

"Permit me here to remind the reader that the great Italian chemist Selmi was the discoverer of ptomaïnes, and that this man reaped only ingratitude for his great scientific achievements, and, as a result of the injustice done him by the government of newformed Italy, died broken-hearted.

"The discovery of ptomaïnes and toxalbumins, however, has and can have no value from a therapeutic point of view, while to pathology, as before stated, it is of the greatest importance.

"This judgment forces itself imperiously upon me, and when called upon for my opinion, I did not need to see the 'lymph' first, for the published reports respecting its chemical nature were sufficient to impart the scientific certainty that it could not be capable of producing those slow and wonderful curative modifications in the inner organic and biochemical sphere which are indispensable to the correction and cure of the pretuberculous stage,—that is, those organic conditions in consequence of which the patient enters the world burdened with phthisis and lives for years as a consumptive, until finally, as a result of various determining influences, the tuberculous disturbances ensue. Unfortunately, some of those who have had the privilege of seeing the 'lymph' with their own eyes, were intellectually short-sighted; hence the occurrences which have taken place are readily explainable.

"As I have before stated, that form of therapeutic action which is alone capable of successfully treating dyscrasic and dystrophic diseases (provided always that they have not yet entered the anatomical stage of complete incurability) is to be accredited only to exceptional, hygienic, and long-continued influences, or to several medicaments of mineral origin.

"The biological action of the ptomaïnes or toxalbumins can belong only to the category of the biological effects of the alkaloids and the glucosides or other definite organic principles. All these organic substances—among which I include all the chemical vaccines (*matières vaccinates*) discovered of late years—are excreted with more or less rapidity (as we are taught by physiology and general anatomy) by the kidney, without leaving a trace behind.

"Writers have not failed to bring forward the hypothesis that these vaccinating substances during their passage through the animal organism have been capable of so modifying its vitality—that is, its nutrition—as to produce a chemical alteration of the bodily secretions or a dynamic modification of the cells, thus making the latter more congenial to phagocytosis, etc. (Bouchard). But enough of this. Such a mode of argumentation, based on the modification of vitality, on phagocytosis, on increased diapedesis of the leucocytes, etc.,—studies of which are now proceeding in the laboratories after a fashion fairly fantastic,—are rather disposed to recall a chapter from the medical romance of a Silvius de la Boe and a Van Helmont than the progress of the experimental medicine of which our age is so proud. That such studies must be zealously continued in the laboratories no one will deny, but to believe that they will ever exercise a substantial influence on the method of treating disease, or prove successful, is simply *naïve*, and those who pose as the banner-bearers of this movement in research cannot *bona fide* defend it, if they would be honest towards science.

"We greatly regret that those who have

been extravagantly enthusiastic on the subject of the Koch remedy did not at once perceive these distinctions based on the laws of true scientific pharmacology and rational therapy. But this ignorance does not surprise me in the least, as the belief seems to prevail that rational therapy is to be studied only in the laboratory, and as pharmacology, moreover, in order to parade its epithet 'experimental,' and accord with the pure experimentalism of pathology, has become an exclusive branch of the laboratory, thus producing only bitter fruit; and this for the reason that it confines itself to the multiplication of its curves, with or without curare, atropine, etc., thinking thus to ascertain the biological effects of medicines without investigating the innermost nature of their action, which must be regarded as the most important part of the pharmacological problem, if it is to be utilized with profit.

"We need only recall the sad history of the antiperiodic and antithermic agents, another splendid gift from the therapy of the laboratory. I was the first to recognize their true value, and declared them to be poisons as early as the year 1882. But the evil had to run its course, and God only knows how many of the sick have fallen victims to this alleged progress. To-day we are arriving at a recognition of the correctness of my early statements.

"I can foresee no effective, salutary progress in experimental pathology, save as the result of the co-operation of chemistry, physiology, and the clinic, and the fact that my views have been received by distinguished men of science with applause fills me with gratification.

"Accordingly, the biological action of the Koch 'lymph' cannot exercise that slow, modifying influence upon metamorphosis which is alone capable of correcting the biochemical deviations from the physiological type. Either the action is *nil* when the 'lymph' is administered in microscopical doses (and by microscopical doses of the Koch 'lymph' we understand, for example, $\frac{1}{20}$ milligramme), or it is toxic when the 'lymph' is injected in quantities of from .001 to .005. I would even say toxic and lethal, for even these small doses have caused death in some cases, due to ignoring the degree of resistant power in the individual.

"It was, therefore, simply foolish to hope that the Koch 'lymph' would remove that special organic peculiarity which forms the so-called predisposition to tuberculosis, or, in other words, those biochemical conditions which render the organism an appropriate soil for the culture of the tubercular bacillus. In order to modify these organic conditions, many months, if not years, of clinical treatment are required,—in accordance with many analogous instances, such, for example, as the cure of constitutional syphilis, especially in ancient cases. Every physician knows that in the latter instances the iodine and quicksilver treatment must be repeated during the course of many years to insure against the disagreeable surprises of this treacherous evil.

"Hence the question suggested itself to me, how can such a slow modification or alteration of the biochemical conditions of the organism, requiring many years for its consummation, be produced by the Koch 'lymph,' if we bear in mind its chemical character and the terribly toxic action which it inevitably develops when the organism is in condition to respond to its effects? This conclusion seemed to me so convincing that I considered it superfluous to enter on the citation of proofs. Moreover, the facts have unfortunately confirmed my suppositions, and I have penned these comments only in my desire to show that on the day when I openly expressed my opinion of the value of Koch's discovery as a cure for tuberculosis, I was then, as ever in my life, guided only by my convictions, based on scientific principles and incontrovertible clinical observations.

"But how can a true clinician even dream that the organic predisposition to phthisis may be modified and cured by means of an organic medicament, whose action either is not to be recognized (homœopathic doses), or else produces a terrible intoxication, which, fortunately, is only transient, like the poisoning from alkaloids when they do not result fatally?

"Even if Koch's statements respecting the elective or specific action of his 'lymph' are to be accepted as established and true, it would have been more worthy of a man of science had he simply stated the bare truth without further commentary. I am of the opinion that such a course would have been far more humane than that of the daily press (for which Dr. Koch is not at all to blame), which had begun to publish fabulous reports and promises of marvellous cures for the unhappy sufferers from tuberculosis. Now, after the lapse of scarcely two months, disappointment and discouragement have set in, and no one ventures to recall the delirium of enthu-

siasm of last November, or to measure the injury wrought by those reports.

"To resume. The Koch remedy is a powerful organic poison, and in such capacity it acts, putting the organism to a severe test without possessing the power to kill the bacillus or influence the organism in such manner that it shall not continue to yield a soil fitted for the culture of the microbes. This is the inexorable, logical conclusion. Hence the question forces itself upon us: On the basis of what experimental results is it to be assumed of the Koch 'lymph' that it is a cure for incipient phthisis?

"The lay world, as also the great majority of physicians, who, for various reasons, are given to a superficial examination of questions, and accept the crude fact without further thought, greeted my critical study with severe reproach. They express surprise when they see the palpable difference between the unfavorable clinical facts (which I had expected) and the preliminary experiments of Koch, which are not to be questioned,—namely, the immunity from bacillary tuberculosis achieved by him with guinea-pigs by means of injection of his 'lymph.' I see no contradiction whatever.

"The results obtained by Koch in his laboratory are not to be doubted, and are worthy of all admiration. Unhappily, the results obtained in the clinics and hospitals are not less true. In the discourse alluded to above I referred to this clearly enough: 'I can understand that Koch's point of view was very alluring, and I willingly recognize his experiments, in which he imparts to the healthy guinea-pig immunity from the tubercular bacillus. Such facts are neither new nor few in number. Science has recorded them for the past ten years, and the names of Pasteur, Chamberland, Charrin, Roux, Salamon, Bouchard, and others are entered in the golden book of biological science. But between the sincere admiration with which every physician and savant must greet this triumph of the laboratory, on the one hand, and the assumption, on the other, that here are to be sought the means for imparting immunity to a consumptive family, or for the cure of tuberculosis already active, there yawns a chasm, which it is folly to hope to bridge by the resources of the laboratory.

"We shall accordingly find ourselves still confronted by the same lack of experimental consistency, if it be insisted on applying to the human organism the results of laboratory experiments, as though there existed no difference. Here we have the Gordian knot of the whole question. It is so true that we need only express it, in order to comprehend that the failure of such an application is to be confidently anticipated. For what concordance, or identity of biological factors, is to be dreamed of as existing between the healthy guinea-pig, in which tuberculosis has been artificially produced, and into the body of which the protective 'lymph' is injected simultaneously or shortly before or shortly after, and the peculiar and only vaguely-known biological conditions which give rise to a predisposition to tuberculosis? These are two altogether different chemico-biological elements. One need be neither "a prophet nor the son of a prophet" to comprehend and anticipate that one of the two experiments must fail. Now, as it must be allowed that the experiment with the guinea-pig has succeeded, it is not less certain that the trial with a human being must be disappointing. And here lies the great secret.

"Countless experiments have been made of recent years in the laboratories, in order to render various animal species immune from or refractory to certain diseases, by vaccination with chemical substances representing the metabolismic products of the bacteria. I cannot here treat the subject in greater detail; suffice it to say, that from the experiments themselves may be seen how the effects differ, however little the conditions of their existence may vary. How, therefore, can one presume to pass to the clinic with the results of laboratory research, in the *naïve* thought of achieving the same results under very different biochemical conditions, which, moreover, cannot possibly be determined? Is not such an expectation visionary?

"This and no other is the cause of the therapeutic barrenness of so many costly experiments with special reference to those substances from which curative powers were expected, and which are capable of producing deviations from and disturbances of metamorphosis. Unhappily, I have never yet been disappointed by this form of progress, and for a quarter of a century I have been repeating the truth in my lectures and writings. I, therefore, regard as excluded from possibility not only any curative action of the Koch 'lymph' in the treatment of certain organic conditions leading to phthisis, but hold that a discovery proceeding fr

the same source and accomplishing the same purpose can never be made, and I shall continue to maintain what I stated at the outset, —'False premises, false consequences.'

"This is the basis of my therapeutic confession of faith. I hope to be pardoned for my outspoken frankness and, what may seem to many, my presumption. My heart fairly fails me when, in the very face of the failure and cruel disappointment which we have been witnessing for years, the interested devotees of a false method in therapeutics, in order to hold themselves harmless from the assaults of truth, delude the credulous public with new hopes clad in stilted phrases, and bombastically glorify the 'new-opened vista,' the 'great future,' the 'certain triumph,' etc.

"Though I have endeavored to show in the foregoing that injections of the Koch 'lymph' are worthless for the cure of tuberculosis of the lungs (since it can neither exterminate the supposititious provocation of the disease or affect the peculiar conditions of the organism), I would, nevertheless, approve of such therapeutic measures if the agent to be injected were harmless in character and availed itself of the courses of the blood only in order to reach the morbid tissue, destroying it by elective action without otherwise assailing the organism. I cannot, however, concede that, in the hope (and even in the certainty) of extinguishing a consequence of disease, while the action of the general cause remains unaffected, and in view of the fact that the bacillus is not destroyed, we are justified in evoking such a disturbance in the entire organism that we thus occasion a new and severely acute form of disease, which, though of short duration, is not unattended with danger. I shall refer only to the very grave phenomena ensuing with many patients after the injection of the Koch remedy, and recall the condition of the heart after the administration of even small doses: Accelerated, dicrotic, irregular, and at times thread-like pulse was the result, so that it became necessary to elevate the function of the heart-muscle and the vascular tone by the administration of alcohol and other excitants.

"I leave unnoted the symptoms caused by the swelling of the tissue surrounding the tubercular neoplasm,—a swelling which, in cases of tuberculosis of the lungs and larynx, may so affect the breathing function as to menace seriously the life of the patient.

"From a physician's point of view, I cannot sanction this mode of treatment, as such a therapy is illogical and contradicts the fundamental maxim, '*Ne noceat!*' which must be borne in mind by every physician in the treatment of his patients. The great celebrity of the investigator who has discovered this method, and even the many years of uninterrupted and arduous labor which he has applied to it, does not suffice to remove my objections. In view of his great scientific accomplishments, I must indeed pay the learned gentleman my tribute of recognition and express my sincere applause; as a physician, however, I feel by no means prompted to agree with him.

"I trust to be pardoned for having thus unreservedly expressed my opinion respecting this alleged discovery of a cure for tuberculosis of the lungs, without any regard to persons. *It is my conviction that thus far Koch has discovered a new and terrible poison, but one which is very far from a cure for tuberculosis.* That is the truth. Should it be my pleasure to see a single case of tuberculosis of the lungs positively cured by the Koch 'lymph,' then I shall give my heart-felt applause, and penitently confess the error of my assertions. But, be it noted, cases of real cure,—not fancied cures, such as are daily described at length in the political journals, which constitute themselves in good faith the heralds of such miracles, *ad usum delphini*, and serve only to deceive the public.

"For the honor of my country I wish that all the distinguished physicians and scientists who are really concerned for the true progress of science would follow the example of eminent French, English, and even German physicians, communicating the true result of their observations without prejudice and without reserve; this is, indeed, the first duty of the true physician, for there is nothing baser than an abuse of the credulity of suffering humanity.

"With respect now to the published results in the cure of lupus, I am forced, as a non-surgeon, to maintain an expectant attitude, as I should be an incompetent judge.

"It is to be hoped that the Koch discovery is an excellent and infallible cure for lupus. However, it is to be remembered that this disease is not altogether identical with tuberculosis of the lungs,—I recall, among other things, the varying virulence of the bacilli, as shown by Lindgard,—and that, aside from this difference, surgery has heretofore achieved cicatrization for a period of several months, and even a year, by means of curetting, scarification, and chemical measures.

"Moreover, from the experience thus far acquired, it by no means results that real cures are to be reported, for we learn, even from the surgeons who have employed the remedy, that relapses not seldom occur; and Bergmann, one of the most enthusiastic apostles of the Koch method, received back into his clinic a lupus patient who had been dismissed as cured after treatment with the Koch solution.

"At present, therefore, there is no occasion for enthusiasm. During my clinical experience of thirty-five years it has always been my custom to cherish the greatest reserve towards new remedies, as well as other things. In the cure of disease, the final dropping of the curtain is represented by a stable cure. Scenic effects are not cures in my eyes.

"It now remains for me to say a few words respecting the value of the Koch 'lymph' as a means of diagnosis. I shall be brief.

"In surgical diseases and in pronounced tuberculosis of the lungs, diagnosis is, unfortunately, free from all doubt; and if it were —happily for the patient—dubious, I should not feel prompted to expose my patients to the dangers connected with the injection of the 'lymph,' in order to have the melancholy certainty that I was really dealing with the tuberculosis, especially as in all theoretical probability (which has been fully confirmed by the results of the investigations of Cornil and others) it is certain that the local reactions arising about the latent tubercles are capable of accelerating the appearance of the severe phenomena proceeding from the existing condition of the lungs. In the face of these effects may we ask, Of what use to the patient is the certainty of the existence of tuberculosis? This certainty is, unfortunately, equivalent to a giving up of the patient and a confession of impotence on the part of the clinician.

"I will concede the great value of a diagnostic auxiliary which enables the physician in dubious cases to recognize the presence of a positively curable disease, such as syphilis, for example. When such cases present themselves to the physician, I believe that, instead of tormenting his patient with the use of the Koch remedy, an iodine-quicksilver cure is to be prescribed. This method will remove every doubt in a more decisive manner, since it will really cure the patient if the case is actually one of syphilis.

"I must believe that no clinician would dare, in cases of dubious diagnosis, to forego the iodine-quicksilver treatment, simply because, after injection of the Koch 'lymph,' that reaction ensues which, according to Koch, should occur only in the presence of tuberculous affections. I say 'should occur,' since even the much vaunted diagnostic value of the 'lymph' has been materially shaken by numerous experiments made by reliable observers in cases of *positive tuberculosis, in which no reaction occurred*, as also with *non-tuberculous patients in whom the well known symptoms of reaction were nevertheless exhibited!* What, then, becomes of this diagnostic value? I must confess that the great Berlin bacteriologist would have done much better had he permitted to mature his own observations which form the basis of his communication of the 13th of November last. The dignity of science and the welfare of humanity would have been thus promoted.

"With respect to the diagnosis of deep-seated tuberculosis, such as the mesenteric and the meningeal, it may be readily seen that the 'lymph' can only produce grave effects, and may even accelerate the death of the patient.

"In view of the foregoing, it may well be asked whether the high valuation of the Koch 'lymph' as a diagnostic means was justified. I will not enter upon further detail here, as I wished to see this question of rational clinical therapy treated only from a general point of view, and, whatever may be urged, rational clinical therapy can never be the legitimate child of bacteriology or of the chemistry of the laboratory. In the pursuit of the latter idea, we have thus far, indeed, discovered wonders in the reagent glass and in the experimental animal, only to be greeted later, as a rule, with disappointment in the hospitals and clinics.

"I hope that a similar destiny is not in store for Koch's discovery, and ardently wish that a whole series of further earnest investigations may show to me that we are in the presence of a true and real therapeutic discovery, and that the latter may not have the experience which recently greeted the notorious antirabic method, to which not a few persons were sacrificed, while the number of cures remain *nil.*

"Germany may continue to chant its hymns of rejoicing, after the fashion of France, which, at an earlier date, could scarcely contain itself with enthusiasm. For the nations mentioned a zone of moderation might be maintained, and this might have been of as much service with respect to Pasteur as it is to-day with regard to Koch."

THE VALUE OF KOCH'S REMEDY IN THE TREATMENT OF LUPUS.

In a series of interesting lectures on the nature of lupus, delivered by MR. JONATHAN HUTCHINSON in the London post-graduate course, the following statements were made as representing his estimate of the value of Koch's remedy in the treatment of lupus (*Lancet*, January 31, 1891).

"As all are aware, it is now about three months since this remarkable fluid—a glycerin solution of substances resulting from the pure cultivation of the tubercle bacillus—was placed in the hands of the profession. It was reputed to have the power, when used by means of hypodermic injection in most minute quantities, of causing the cell-structures adjacent to bacillary deposits to inflame. Very soon after its introduction it was announced that the most remarkable demonstrations of its effects were to be obtained in cases of lupus vulgaris. In these it caused the patches to inflame, and certain small fragments to undergo necrosis, and after this a process of healing set in, which left the patient, if not absolutely cured, at any rate in a greatly improved condition. During the last three months trials of this remedy have been very extensively made, and I now purpose to attempt some sort of brief *rêsumé* of their results. I know that it will be said that it is too early to arrive at any conclusions, and, in a certain sense, this must be admitted. Very definite results have, however, on some important points been obtained, and it is highly desirable that, for the guidance of future investigators, these should be stated. My own personal experience—that is, as regards patients under my own care—has been very small, but through the kindness of many friends I have had opportunities of collecting facts over a tolerably wide field. In endeavoring to report upon them it may, I think, be stated, in the first place, that the original statement that the injection of Koch's fluid does cause lupus patches to inflame has been well borne out, but not without some striking exceptions. In a case under my own care, the portraits of which I have shown you, and concerning which the diagnosis of lupus vulgaris cannot come into any question, no effect whatever was produced on the patches, although the patient's temperature rose on every occasion after nine or ten successive injections. In this case Dr. Heron made the injections and examined the patient at all stages with the utmost care. I avail myself of his skill as a diagnostician in reference to diseases of the lungs to assure you that the patient had no indications of pulmonary tuberculosis which would explain the recurrence of febrile reaction. After about a month's treatment, the injections having ceased to produce fever, we laid them aside, and the patient is now exactly as he was before they were begun. I have received information concerning more than one case in which somewhat similar results were observed. In one, about which Dr. Abraham is my informant, neither febrile reaction nor local reaction resulted, although the patient displayed nodules of the apple-jelly deposit of lupus in considerable abundance. Without an exception all my friends report that, in the cases in which the lupus patch has been made to inflame, the results, as regards its subsequent improvement, have been very definitely good. Large areas, which had been previously swollen and covered with scab and crust, have been made to heal, and the resulting scar has been flat and sound. No one, however, ventures to report an instance of complete cure. Of the cases which have been shown to me as the most satisfactory, I am bound to say that in every one there has been evidence at some part of the edge of the remains of lupus tissue, ready, I do not doubt, to start into fresh growth on the slightest provocation. In reference to this point I have to make a most important assertion, and that is, that the treatment does not always influence the essential element of lupus. The brown apple-jelly-like deposit, which is universally acknowledged as the most characteristic of the lupus conditions, sometimes remains untouched. This assertion is illustrated by a case which Dr. Heron was kind enough to show me, and in which he had practised injections some ten or twelve times. In this instance the inflammatory swelling of the parts affected had been quite got rid of and the patient considered herself very much benefited. Nodules of lupus were, however, scattered about her cheeks in a conspicuous manner, and had she come under my care without my knowing anything of the previous treatment, I should certainly have regarded her as an ordinary case of lupus, still standing in need of efficient treatment by either the cautery or spoon. In the case which Dr. Gayton was kind enough to send us last week—and which had been under Mr. Watson Cheyne's treatment in King's College Hospital, and had received great benefit—you had equal opportunities with myself of judging whether it could be called a cure. The lupus edge was still there. As substan-

tiating my statement that the treatment does not always destroy the most characteristic part of the lupus formation, I might quote from a letter from Mr. Warren Tay, of the London Hospital, who, speaking of a case in which great benefit has been obtained, remarks 'that there still remain nodules which I should much like to attack with the scoop.' The cases which appear to derive the greatest benefit are those in which there is most of inflammatory swelling, and in which the more specialized elements of the lupus process are least abundant. You will see the bearing of this statement. Should it be supported by future facts, we shall be obliged to suspect that the remedy is, after all, one for certain conditions of the inflammatory process, and not for tuberculosis. Even in this position, however, it is possible that it may still prove of great help to us in the treatment of certain forms of lupus. I am not aware that it has yet been tried in any of the cases of what has been described as perfectly quiet lupus, such, for instance, as those of which I showed two portraits illustrating single-patch lupus occurring on the cheeks of healthy persons, characterized by a thick growth of apple-jelly, and by the entire absence of any surrounding inflammation. These cases would be very suitable ones in which to test the power of the fluid in attacking the lupus growth itself; and from what I have seen thus far I quite expect that they would escape its influence. In the more rare forms of lupus the remedy has not yet been tried. On lupus erythematosus, however, a good many experiments have been made. It was foretold by those who believe that what they call 'true' lupus is bacillary, and that lupus erythematosus is not so, that the fluid would have no effect on the latter; and, in the main, this prognostication has been fulfilled. In a very marked case under my own care, and in which Dr. Heron was kind enough to carry out the treatment, the patient had good febrile reactions after repeated injections, but without any inflammation of her lupus patches. This remarkable result was perhaps explained by the supposition that the lady had tuberculosis of the lungs as well. She was, as is usual in lupus erythematosus, of a phthisical family, and she had herself been treated for suspicious symptoms. In her case, a week after we had abandoned the injections in the belief that they were doing no good, the erythematous patches on her face suddenly disappeared almost wholly. A number of disks on the upper part of her chest, however, some of which were so thick and definite that some observers were inclined to regard them as lupus vulgaris, remained wholly untouched. She had had nine or ten injections, and latterly in full doses. I have seen this patient today, and her face patches are already returning to their first condition.

"Apart from the question of its direct influence on the lupus itself, some collateral observations of much interest have been made as to the possible results from Koch's fluid. I am told that it has repeatedly caused general erythematous eruptions on the skin, and, in some, nodular effusions into the cellular tissue. In one case the inflammation of the lupus (on the face) passed into unquestionable erysipelas of a rather severe type, and the patient was for some time in danger. In two cases, at least, during the febrile reaction old chilblains became again inflamed.

"If we are obliged to report that nothing that can be called a cure of lupus has yet been obtained in London practice, it may seem unnecessary to ask whether cures are lasting. On this point, too, however, I am sorry to say that some evidence is already forthcoming. I fear it is the fact that relapses occur very quickly. The patient, who was taken to Berlin by Mr. Malcolm Morris and Dr. Pringle, and was for a time supposed to be almost cured, is now, I am assured by both the gentlemen concerned, in a condition almost as bad as before the treatment.

"If, on the whole, we are obliged to return a qualified verdict as regards this method of treatment in London, it by no means follows that it may not in the future be put to some use. On the contrary, it has in many cases done very great good, and no one can doubt that the fluid possesses very remarkable powers. It may be that in the future we shall learn to combine the older methods of destruction of the lupus deposit by means of cautery or caustic, with suppression of the attendant inflammation by injections. What I have seen would certainly lead to the belief that some patients are by the injections brought into a condition much more favorable for surgical treatment than they were before. The ill effects of the treatment on the general health, although obvious and considerable for a time, seem to pass away. No one has reported to me any instance of permanent damage. I may confess that nothing which I have seen leads me to be hopeful that very prolonged periods of treatment will avail more than short ones If

febrile reaction has ceased to occur, I do not think that there is any further hope that the lupus nodules will be attacked. On this point, however, as well as on many others, we need further experience. Among those to whom I have been most indebted for the facts upon which the preceding statements are based are Dr. Heron, Mr. Watson Cheyne, Mr. Warren Tay, Dr. Gayton, Dr. Radcliffe Crocker, Dr. Pringle, Mr. Malcolm Morris, Dr. Colcott Fox, Dr. Abraham, and Mr. James Startin. To these gentlemen you and I are alike indebted for the opportunities they have afforded us for seeing their cases this afternoon. For myself I cannot sufficiently express my sense of the compliment they have paid me in placing their facts at my disposal and giving me leave to make my own criticisms. I hope that I have not been premature in expressing the opinions which I have done. If I have spoken with less enthusiasm of the results of Koch's treatment of lupus than it really deserves, I can only say that it will give me great pleasure in the future to change my opinions."

PERITONITIS IN INFANCY AND CHILDHOOD.

Dr. J. Lewis Smith read a paper before the Section in Pediatrics at the meeting of the New York Academy of Medicine, held November 13, 1890 (*New York Medical Journal*, December 13, 1890).

He said that peritonitis was likely to occur at any age, but the most interesting and fatal form was that which occurred in the newly-born. This form had in times past been quite common in maternity wards and in tenement houses, in degraded and filthy families, who had no knowledge or thought of sanitary requirements. There was no doubt that in the etiology of peritonitis in the newly-born microbes played a most important part. The septic matter no doubt entered the system through the umbilicus, usually from the use of foul dressings, foul water employed in washing, foul fingers of the nurse, or other sources. Umbilical inflammation, with perhaps ulceration and the formation of a phlegmon, might occur, and septic matter be taken up by the umbilical lymphatics or blood-vessels and carried into the system. Peritonitis occurred in infancy and childhood from a variety of causes. It sometimes resulted from extension of inflammation from the abdominal walls or from one of the viscera which was the seat of a tumor or adventitious growth, encroaching upon and irritating the peritoneum. Septic infection occasionally caused peritonitis, when the conditions were favorable for it, in older children as well as in the newly-born. Chronic degenerative disease of the kidneys was also a recognized cause of peritonitis, but less frequently in children than in adults. It was now known that a considerable number of the diseases which were formerly supposed to be due to taking cold were caused by microbes. Perhaps there was too great a tendency at the present time to ignore thermal changes in the atmosphere or exposure to cold as a cause of disease. In ill-nourished and scrofulous children inflammation and cheesy degeneration of the mesenteric glands sometimes gave rise to inflammation in the portion of the peritoneum which covered them. But peritonitis in infancy and childhood more frequently resulted from disease of the hollow organs than from that of the solid viscera. Intussusception, attended by bloody stools, tenesmus, vomiting, abdominal tenderness, and the occurrence of an abdominal tumor, was more common in infancy after the age of six months than in any other period of life. Another not infrequent cause was appendicitis due to the lodgement of a foreign substance in the appendix, or of a concretion, which caused by its presence pressure, inflammation, ulceration, and finally perforation. Children less frequently than adults had ulceration of Peyer's patches in typhoid fever, but it sometimes occurred, ending in perforation or rupture and fatal peritonitis. Peritonitis had been known to follow traumatism of the abdomen. Recently a considerable number of cases had been published, showing the microbic origin of peritonitis in certain instances. Some of the cases were caused by accidental inoculation, and others were due to the inhalation of sewer-gas. Experiments had been made, designed to elucidate the casual relation of microbes to peritonitis. Prince had found that the injection into the abdominal cavity of a small amount of an irritant not containing microbes—such as mineral acid, phenol, and nitrate of silver—caused peritonitis, but it was always serofibrinous, never purulent. Grawitz, in his experiments, had shown that, as a rule, two things were necessary for the causation of purulent peritonitis,—to wit, the introduction into the peritoneal cavity of pus-producing organisms, and an abnormal state of the peritoneum from injury or contagious disease.

Another observer had shown that if the peritoneum was in its normal state it might absorb a considerable amount of septic matter with no serious result, but that if it was injured or the subperitoneal connective tissue was exposed to infection, purulent peritonitis was likely to result. Experiments thus far had not perhaps been very satisfactory in throwing light on the microbic origin of peritonitis, but they seemed to show that purulent peritonitis, as a rule, resulted from the action of microbes, and the microbes known to be pathogenic caused peritonitis when injected into the peritoneal cavity, while the non-pathogenic germs did not produce such a result, even in a lesser degree. Tubercular peritonitis occurred much more frequently in infancy and childhood than in adult life. The symptoms, when peritonitis was due to a pre-existing disease, were, of course, accompanied by the symptoms of that disease, by which it might be rendered more or less obscure. The symptoms might begin in any manner, with gradually increasing tenderness of the abdomen, or abruptly with a chill or rigor. Constant pain increased by movements of the body or by pressure was the distinctive symptom occurring in localized peritonitis at the seat of the inflammation, but in diffuse peritonitis it began at some point and gradually extended over the abdomen. Tenderness on pressure was seldom absent, and the pain intensified by coughing or a full inspiration was in most cases seen in the early stage of the disease. The extension of the inflammation over the intestines produced paralysis of their muscular layer so that they became distended with gas. In cases of great abdominal distention the apex of the heart was carried upward, the liver and spleen were pressed upward and backward, and the distended transverse colon or portions of the duodenum or jejunum might lie in front of them, so that the normal dulness on percussion over these organs was replaced by the tympanitic resonance. The percussion-sound over the effused liquid was, of course, dull. The patient was quiet on account of the pain, lying upon the back or side with the knees flexed to relieve the tension, but the position was not uniform, as the legs might even be found extended. Constipation was usually present in the early stage. Vomiting was a common and painful symptom. The pulse was accelerated, in some cases very frequent as well as very feeble. The countenance was anxious, but the mind was clear, or there might be a mild delirium, the speech being incoherent and rambling. Retention of urine was common. In the pathological anatomy of localized peritonitis the action of the cause, as the name implied, was limited to a portion of the peritoneum. In acute diffuse or general peritonitis the inflammation commonly began at one point, but it rapidly extended over the peritoneum. The relative proportion of the different inflammatory products varied greatly in different cases, and in all not only were serum and fibrin present, but pus-corpuscles could be detected under the microscope. The fibrinous exudation upon the peritoneal surface occurred either in patches or continuously over a considerable part of the visceral peritoneum. It was prone to form a covering of varying thickness over the large and immovable organs. The connective tissue underlying the peritoneum underwent proliferation, producing granulations, which, when coming in contact with opposing surfaces, united, forming adhesions, and these at times involved the intestines and viscera, producing disastrous results. In purulent peritonitis, the pus formed, being heavier than the serum, gravitated to the lowest part of the abdominal cavity. In patients that recovered the serum was the first to be absorbed, and the fibrin and pus-cells underwent fatty degeneration, became granular, liquefied, and were absorbed. Sometimes collections of pus became encapsulated and remained inert. By careful attention to the distinctive symptoms a mistake in diagnosis ought not to occur. Peritonitis in children was always a grave disease; in most instances its progress was rapid towards a fatal termination. The author was confident that much could be done in the way of prophylaxis in these cases if a little more attention was given to the matter. Scarcely any disease more urgently required early and judicious treatment than the one under consideration. Proper selection of the diet was a matter of the greatest importance. Such food should be recommended as was most concentrated, predigested, or easy of digestion, and such as would give the minimum amount of fæcal matter. Sterilized milk was by far the best food for this purpose. For children over two years of age some farinaceous food could be added. Purgatives should be avoided. A nutritive or laxative enema was the best for this purpose. Of the drugs, opium, camphor, digitalis, alcohol, and strophanthus were used, as the urgencies of individual cases required. The removal of the cause of a disease

could be effected safely without material injury to the patient, evidently contributed greatly to recovery.

The CHAIRMAN said that a great deal of stress had been laid from time to time upon the grape-seed point. He had never yet found such seeds in any appendix vermiformis. He thought it was a little hard on children that, on the strength of this apprehension, they were to be debarred from eating fruit.

DR. J. E. WINTERS thought that the most important causes of peritonitis in children were typhlitis, perityphlitis, appendicitis, traumatism, tuberculous disease, and intussusception. In regard to the first three conditions, the cases, of course, required to be seen early, when he thought that a critical examination ought to result in a correct diagnosis. The traumatic cases were more difficult, for the reason that most children were unwilling to acknowledge the indiscretion which had led up to the traumatism. In dispensary practice this was particularly difficult to elicit; but brutal treatment by the parents was a frequent cause of the peritonitis. The tubercular variety required acquaintance with the family history, and called for a thorough examination as to the existence of general tubercular disease in the patient. Without all these points, few physicians would be willing to make a diagnosis of tubercular disease in the peritoneal cavity. In intussusception the symptoms were sufficiently pronounced to make a diagnosis tolerably easy. A diagnosis of peritonitis from either of the three first-named causes having been made, then came the question of management. He thought that at the present time most men used cold. The inflammatory processes were sufficiently superficial to be influenced by the external application of cold, and he thought that the results were, on the whole, more favorable than from heat. Only in the case of absolute inability on the part of the patient to tolerate its application would he use anything for external application except ice. If cold would not relieve the pain, then morphine must be used. It was important to remove all substances from the large intestines, and for this purpose he thought that it was best to employ small doses of triturated calomel.

The frequent injection of ice-cold water into the rectum was desirable after the use of the calomel, or of castor oil. In the traumatic cases, having gained the confidence of the child and obtained a careful history of the case, he thought that cold applications and a clearing out of the alimentary canal were, as a rule, sufficient, together with the strictest dietetic management. In the tuberculous cases the physician could endeavor to give relief by counter-irritation by means of iodine. In this way the early indications might be met. If suppuration was excepted, an operation might be resorted to. In cases of perityphlitis and appendicitis, where, having made a casual diagnosis, and having failed by judicious means to relieve the local symptoms, laparotomy should be suggested. As now undertaken, the operation was not serious, and it was far simpler at the outset than after extensive adhesions and infiltrations had taken place.

DR. SMITH thought that, if the surgeons were to examine the concretions carefully which they found in the appendices, they would often discover that seeds and other foreign bodies were the real cause of the trouble. He was not inclined to withdraw from the stand he had taken in the matter of grape-seeds.

TREATMENT OF DIABETIC COMA.

In the *Berliner Klinische Wochenschrift* for August 25, 1890, DR. SCHMITZ publishes his views as to the nature and causes of diabetic coma and his treatment of it. This paper has been analyzed by DR. W. A. STEWART, who publishes an abtract of it in the *Medical Chronicle* for November, 1890.

The author recognizes two distinct causes. The first is weakness of the heart's action, caused by the action of the sugar in the blood on the muscular fibres of the heart. In diabetic subjects, even when fat and seemingly in good condition, the body muscles are lax and soft, and the results are insecure gait and weariness easily produced. The heart muscle, he argues (and post-mortems support him), is in a similar condition,—also suffering from degeneration of its fibres. The cyanotic face, the quick breathing, and the slow, small pulse, getting quick and irregular with the slightest exertion, point in that direction. Then the cardiac impulse is hardly perceptible, the area of heart's dulness is increased in breadth, and, on auscultation, not only at the apex, but on the aorta, the first sound is anything but clear. In severe cases it is barely audible, or even inaudible, and the beat, especially on exertion, is frequently irregular. With such a heart there goes short breath,

giddiness, sounding in the ears, and great sense of weakness. Suppose such a heart is wearied out by over-exertion, the result is that the breathing is affected, the appetite disappears, the head suffers from pain, giddiness, and an inclination to vomit, and if no precautions are taken, or prove of no avail, the arteries get more and more empty, the veins more and more full, and carbonic acid accumulates in the blood, somnolence steals on, coma succeeds, and the patient dies poisoned. Instead of striking work gradually, the heart may stop suddenly, and in some cases unexpectedly burst without even any preliminary over-exertion or over-exhaustion (*e.g.*, case of Baron von Haymerle, eight years ago).

In such cases the line of treatment is plain. Anything exciting the heart, medicinal or other, must be avoided. Hill climbing, stair climbing, long walks, early rising, Venus and Bacchus in excess, are all to be avoided, as also are bromide of potassium, all combinations of potassium, salicyl, antipyrin, antifebrin, and hot baths. Also narcotics, except when absolutely necessary, and then carefully used. Nutritious, but easily-digested food, a moderate amount of alcohol, fresh and invigorating air,—these are the best drugs. Of course, one must not lose sight of the ordinary diabetic treatment; the above refers to cardiac failure.

In a pressing case the patient is to be kept in the recumbent position, and must neither stand up nor sit up, even for stools or urinating. Stimulants by the mouth, or, preferably, if apt to cause vomiting, subcutaneously (*e.g.*, musk and camphor). The best stimulant of all is black coffee. With alcohol in large doses it is necessary to be careful on account of the succeeding depression favoring collapse. The neglected *castoreum sibiricum*, not *canadense*, he considers a very good stimulant. The great danger lies in letting the patients up too soon, and the great difficulty is keeping them in bed long enough. Schmitz makes it a rule not to let his patients get up until the first sound of the heart, indistinct or vanished, again becomes clear. He gives five interesting cases illustrating well his theory and treatment.

So far as regards the first. The second form of diabetic coma he describes as an acute self-poisoning, which has been named, although not rightly, acetonæmia. This condition is preceded by symptoms mistaken for indigestion, or slight gastric catarrh,—*e.g.*, lack of appetite coming on suddenly, eructations, especially in the morning, of foul gases, great sleepiness and weariness. The sleep, like that of drunkenness, leaves the patient more weary, feeble, and heavy-headed than before it. There is usually constipation, sometimes diarrhœa; the tongue is dry and coated, and the breath smells badly. This condition lasts for about two days, and then the patient gets restless, groans and laments in his sleepy state. The respirations increase to 45, the pulse to 130 or more. The temperature is always raised (38°, 39°, and over). He requires a loud call to rouse him, seems peevish, hardly answers a question, and again relapses into his sleepy condition. He complains, when asked, of thirst and of pains in the upper left side of the abdomen, which, however, is not painful on pressure. These pains or colic attacks come on from time to time, and must be very acute, as they awaken the patient and cause him to cry out aloud. After violent efforts he vomits some green-colored fluid, and then the maddening pain seems to abate somewhat, and he falls asleep until another attack.

A physical examination of the *heart and lungs reveals nothing abnormal.* The pupils are mostly contracted, and react but slightly. Towards the end violent clonic and tonic spasms set in, and death follows in deep coma. It comes quickly, often in ten hours.

The colic, the high temperature, and the clear heart-sounds distinguish this form of coma from that produced by cardiac failure. The treatment is beautifully simple. It consists in clearing out the bowels, constipated or not, with 1 to 2 tablespoonfuls of castor oil. "The poison, be it ptomaïne or toxin, or whatever else, is a product of decomposition in the bowel." The case is simply one of poison; the poison lies in the bowel, and the indications accordingly are to get rid of it as soon as possible. After a thorough purging, resulting in a profusion of black, foul, putrid stools, recovery is remarkably quick. Even in diarrhœa he gives castor oil, and the result is equally good. The purging does not weaken the patient, who seems better after than before the attack. Of eight cases, all equally bad, four not treated with the oil died, and four treated with it speedily recovered. One of these cases may serve as a sample:

"D., three years diabetic, and once in Neuenahr before, fell ill on the journey, and summoned me by telegraph to Cologne. The patient had already suffered some days from constipation, had had eructations of putrid gas, and was suddenly seized with the most violent pains and vomiting. I found the

tient in a very somnolent condition, scarcely able to answer questions. Temperature, 38.6°; pulse, 130; respiration, 40. Here also I did not delay, but gave at once a tablespoonful and a half of castor oil, and the same dose an hour after. After an hour and a half the pains and sleepiness departed, and, when, after two hours, he was relieved of great masses of abominably stinking fæces, his condition became rapidly and remarkably better. He got up the following day, and continued his journey on the same day to Neuenahr, where he continued to improve. He remembered for a long time the abominable taste of the gas."

The poison is in the fæces; who will isolate it?

BASSORIN PASTE—A NEW BASE FOR DERMATOLOGICAL PREPARATIONS.

In the *Journal of Cutaneous and Genito-Urinary Diseases* for February, 1891, Dr. George T. Elliot describes a preparation as a base for dermatological preparations belonging to the class of vegetable mucilages derived from bassora,—gum tragacanth. This substance, which was prepared under his direction by Mr. Lascar, the pharmacist of the Demilt Dispensary, is tasteless, odorless, and almost colorless, insoluble in cold water, and swelling up into a viscous mass when treated with hot water. On being heated with aqueous solutions of alkalies, it is converted into a gum, soluble in water, and, by treating with sulphuric acid, it is transformed into a non-fermentable sugar. This substance—bassorin—is mixed with water, glycerin, and dextrin, and a compound is obtained to which the name bassorin paste can be given. When composed of the substances mentioned, bassorin paste is of the consistency of a jelly, tawny in color, resembling somewhat vaseline. It has no particular odor, is absolutely neutral in reaction, does not decompose when kept a length of time. When exposed to the air it becomes dried, and hence bassorin paste should be kept in well-closed jars; but, even when it has hardened, rubbing it up again with a little water makes it as good as at first. The base is claimed not to come off when once dried on the skin, and thus soiling of the linen or bed-clothes is avoided. When it is desired to remove it, this can be accomplished at any time by a little water or a damp sponge or absorbent cotton Almost any drug at will may be incorporated with the bassorin base. If the one used be soluble in water contained in the paste, the color of the latter is unchanged; but, if insoluble, then the color will vary, according to that of the substance added to it. Those drugs which exist only as fluids cannot be mixed, however, with the base, and neither can alcoholic solutions; but fats may be, yet to a limited extent. The former are excluded, for the reason that they render the base too liquid, and the alcohols cause it to become brittle and hard. The proportion of the fats must be small, for the reason that, if large, they would impair the property the paste has of drying and adhering to the skin. All substances, however, which exist in a solid form are easily incorporated with it in proportions as large as are ever used or found necessary. For instance, zinc oxide may be mixed with the base to the extent of thirty or more per cent.; carbonate of magnesium, ten or more; chrysarobin, fifteen or more; salicylic acid, salicylate of sodium, iodoform, resorcin, boric acid, borate of sodium, sulphur, etc., each and all, incorporate perfectly with the bassorin paste, and without changing its nature or its properties. So, also, while the percentages of the tars do not go quite as high, on account of their oily nature, they may usually be incorporated to the strength generally deemed necessary, though then it is advisable to add ten per cent. of zinc oxide or some neutral powder, as chalk, to counteract any possible impairment of the base's characteristics.

Dr. Elliot does not publish the precise details of the manufacture of this base, but promises that Mr. Lascar will shortly do so, and publish in the columns of one of the pharmaceutical journals, when we will lay the details before our readers.

Dr. Elliot, in conclusion, summarizes the advantages of this bassorin paste over other excipients, as follows:

1. Bassorin paste is a perfectly neutral substance, which, of itself, produces no irritation whatever, and when used alone it acts simply as a protective to the skin. It does not become rancid or decompose, or undergo change when kept for a length of time, unless it be exposed in an open vessel. When this is done it becomes dry and hard, but even then rubbing it up with a little water renders it again as serviceable as at first.

2. It is easy and simple in application, requiring only to be spread upon the skin with the finger or a brush. It dries in the space of a few minutes if so applied, adheres closely,

does not rub off and soil the linen, but forms a flexible coat, which does not interfere with the movements of the body. When its removal is desired, the preparation can be washed off with a little water or a damp cloth or sponge. It remains *in situ* without change for a variable length of time, depending upon the condition of the surface on which it has been applied.

3. With the bassorin paste almost any drug can be incorporated; those which exist in the form of powders or in solid forms in any amount desired; the tars, ichthyol, and oily substances in smaller percentages, but sufficient for all practical purposes.

4. The action of drugs incorporated with it and their effect upon disease appears to be as good as when such are used in other excipients, or perhaps better in some cases.

5. It is of wide applicability, and of value in both acute and chronic forms of disease, its use being limited only by the degree of moisture on the surface being treated or to which it may be exposed.

These properties possessed by the bassorin paste render it, as may be seen, superior to ointments, for the reasons, among others, that it is difficult to keep the latter in constant contact with the diseased surface; that salves soil and stain the linen, and offer such other objectionable features as greasiness, risk of becoming rancid, etc., to say nothing of the discomfort entailed upon the patients using them. It is also of wider application than the collodions and traumaticins, owing to the irritation of the ether and chloroform contained in them, their contractile property, the limited extent of surface over which they can be applied, and the difficulty experienced in removing them when desired.

The bassorin paste would seem to be also superior to the gelatin preparations, in that these latter are more or less cumbersome in their application, having to be heated freshly whenever used, entailing a waste of time, and also frequent and practically unnecessary visits by the patient. Drugs incorporated with the gelatins have also seemed to me not to act as favorably upon disease as when mixed with the bassorin base.

TREATMENT OF ERYSIPELAS.

An elaborate research, clinical and bacteriological, has recently been published by Professor Nussbaum's assistant, Dr. Julius Fessler, on the treatment of erysipelas by ichthyol, a plan which has been for some years extensively adopted in Munich. From laboratory experiments it was evident that, though ichthyol has only a slight effect in preventing the development of staphylococci, it has a very potent deterrent influence on the multiplication of streptococci, and it is well known that it is the latter kind of bacteria that are the cause of erysipelas. The method of treatment consists mainly of rubbing a strong ichthyol ointment energetically, and for ten minutes at a time, into the affected surface and its neighborhood; ichthyol in the form of pills may also be given internally. Where there is a wound it must be very carefully disinfected, and an antiseptic dressing applied. The results of this treatment, as compared with ordinary methods, are embodied in several instructive tables. From these it appears that, while the mean duration of the cases treated by other methods from 1880 to 1888 was about twelve days, in no single year falling below nine days, the cases treated by ichthyol from 1886 to 1888 presented a mean duration of under seven days, while in the first half of 1889 it fell to 5 6 days.—*Lancet*, January 10, 1891.

THE MEDICAL ASPECTS OF TREPHINING IN EPILEPSY.

Dr. J. C. Minor read a paper before the Section of Theory and Practice of Medicine of the New York Academy of Medicine, at the meeting held November 18, 1890 (*New York Medical Journal*, December 13, 1890).

He said that, from long clinical observation, he had concluded that epilepsy did not disappear spontaneously, but that about one-half of all the cases presented for treatment were curable, whether the cases called for medical or for surgical treatment. The reason that surgical interference did not offer better results was, the speaker thought, due to the cases not having been properly selected. He thought that the indications for trephining in epilepsy were pretty definitely marked out. The indications were described under three headings: 1. Those that were plainly traumatic and presented a depressed fracture of the skull, osteitis, and tumors of the brain. 2. Those without any apparent lesion of the skull, but with old cicatrices of the scalp. 3. All those cases of epilepsy the symptoms of which indicated cortical lesions. The speaker was satisfied that more tha-

the cases presenting for treatment would come under one of the above groups. The history of a case was then reported. The patient, a young man, 17 years of age, had five years ago been hit on the head with a brick which had fallen from quite a height, producing only a scalp-wound. Four years later the first attack came on, and during the last year epilepsy had become fully established. The attacks came on with a distinct aura, contractions commencing in the right hand and arm. Pressure on the scar would bring on the aura and produce a typical attack. Trephining in this case had disclosed no injury to the skull, but the removal of the cicatrix had ameliorated the condition. The speaker, from his observations in this case, was led to the conclusion that it was always well to begin the treatment, in cases presenting cicatrices, by removing the scar. Several cases had been reported cured, treated in this manner, and he thought it was well worth trial. He did not think that in trephining at the site of injury the actual lesion caused by it could be found in every case. The contraindications for operative interference were in all those cases where the cause was not clearly defined and in those of long standing where the patient's mind had become enfeebled and the general condition would offer no hope of recovery. Finally, when the indications were for surgical treatment, the operation should be done promptly, as by so doing the best possible chance would be given to the patient.

In the discussion which followed—

Dr. Robert F. Weir was quite in accord with the rules laid down by the speaker. Despite the fact that operations were being done on the brain by some of the most careful surgeons, the mortality was still quite high, averaging from fifteen to twenty per cent. His experience in brain surgery had led to the conclusion that much would yet be done in this direction, but that when the technique of the operation was better understood the results would be better.

Dr. Robert Abbe reported the histories of two cases in which an operation had been performed, the results of which led to the conclusion that conservatism was to be practised in operating in such cases.

Dr. E. D. Fisher thought that it was a difficult matter to say which cases should be operated on and which not. He thought that chronic epilepsy, traumatic lesions with consequent organic lesion, congenital spastic paraplegias with associated epilepsy, and a focal lesion becoming general were certainly not suitable for operation. Cases had been met with where the scar was a source of irritation, but, again, it was often present when it did cause any trouble whatever, so he could not agree with the speaker in thinking that it was a good thing to trephine in these cases. He had a case which had appeared to offer every indication for trephining. The operation had seemed to be a success, the patient had improved for two or three weeks, but had after that relapsed into his old condition. It was the speaker's opinion that all the cases of idiopathic type of epilepsy were originally traumatic.

Dr. L. C. Gray thought that, in reviewing the question of the indication for operation in epilepsy, it would be just as well to first ask what was epilepsy. It was still a question as to whether epilepsy was a disease or a symptom of one, and if either, what were the cause and nature of it? Whether it might not be due to peripheral irritation had been pretty thoroughly gone into, and it was found that after every source of irritation had been removed the attacks went on the same as before. The histories and data were wanting in definite value. This was thought to be due to the fact that cases were not kept under observation long enough, and not followed up with a definite object. Idiopathic epilepsy with marked changes had been known to go on for years without a fit having occurred. There was no doubt that many of the cases were organic in origin. Those that were due to meningitis in early infancy certainly could not be operated upon. Such cases as were due to the same causes were called in the adult idiopathic, simply because the definite course of the disease was not known. The traumatic cases offered but little better results for operative interference on account of the very limited knowledge of the focal centres. The only ones isolated were those of the arm, leg, speech, word-deafness, and hæmianopsia; when we undertook to go beyond that point we were in the field of speculation. It was still a question whether, if operation were performed in cortical epilepsy, the habit of the explosion was not too confirmed to cease. The speaker related the history of a case of subcortical lesion in which no loss of consciousness had occurred. He thought the whole question bearing on epilepsy was still distinctly *sub judice*.

Dr. Minor said that the indications and rules laid down by him had been made up principally from reports and his own clinical experience. He was sure that some cases

had been cured of the attacks by the operation, but he was also of the opinion, as Dr. Gray had expressed it, that the habit could not be easily broken up and that it was likely to return. In operating in cases of idiopathic epilepsy where no scar could be found he had never known it to do the patients harm. The operation in these cases was done on the principle of cerebral pressure. He had recently seen an old patient upon whom he had operated some twenty years ago, removing a large portion of the frontal bone with a quantity of brain tissue. It was interesting to know that there had never been any development of epilepsy, but the mental and moral degradation was complete.

ALBUMINURIA IN PREGNANCY.

EHRHARDT and FAVRE (*Nouvelles Archives d'Obstét. et de Gynéc.*, September, 1890) discuss this subject in relation to a mild attack of puerperal diphtheria in the Paris Maternité. They sum up past theories which have influenced treatment. Rayer traced the albuminuria to hydræmia, which exists during pregnancy. He noted that injection of water into the veins of an animal caused albuminuria, but this fact does not prove his theory. Claude Bernard traced albuminuria to a state of superalbuminosis in pregnancy. Injections of white of egg into the circulation caused albumen to appear in the urine. Gothwald and Monas held that the phenomenon was caused by increased blood-pressure, the gravid uterus compressing the aorta below the renal arteries. Others believed that the uterus, by pressure on the ureters, caused renal disease. Lastly, some pathologists traced the albuminuria to nerve influences carried on by communications between the uterine and the renal plexuses. None of these theories, says Drs. Ehrhardt and Favre, explain why pregnant women suffer from albuminuria only in exceptional cases. They trace the complication to local disease. They examined three hundred placentæ. Of these, twenty were from cases of albuminuria. In nineteen of these placentæ white infarcts were detected, and all the patients except two were subject to severe leucorrhœa when not gravid, and often to colicky pains during menstruation, symptomatic of endometritis. Colonies of bacteria were found in the infarcts, and when some germs taken from infarcts in the placentæ of patients who had suffered from eclampsia as well as albuminuria were injected into the veins of rabbits and guinea-pigs, parenchymatous nephritis was set up. Thus the morbid changes in the decidua which cause placental infarcts are induced by the same agency that induces the nephritis of pregnancy. This agency is the presence of germs in the placenta, which germs produce in non-pregnant patients leucorrhœa and other symptoms of chronic endometritis. The focus of infection being the uterine mucous membrane, that structure requires attention and treatment. When it is unhealthy, the patient may repeatedly bear fœtuses which die before birth through disease of the placenta,—that same disease which, in the opinion of Drs. Ehrhardt and Favre, causes the nephritis of pregnancy, with consequent albuminuria. They intend shortly to describe the precise nature of the disease in the kidneys in these cases. The moral they would draw is,—never neglect uterine discharges.—*British Medical Journal*, January 3, 1891.

PALPATION OF THE NORMAL UTERINE APPENDAGES.

At the December meeting of the Gynæcological and Obstetrical Society of Baltimore, DR. HOWARD A. KELLY read a paper upon the "Palpation of the Normal Uterine Appendages (published in full in the February number of the *American Journal of Obstetrics*). He stated that the normal uterine appendages could always be palpated. There are two avenues of approach,—by the vagina and by the rectum,—and three ways of utilizing these avenues,—first, with one hand; secondly, with two hands, employed bimanually, either by vagina or rectum; and, thirdly, the trimanual method,—by vagina and by rectum.

First.—The examination with one hand is unsatisfactory, and the ovary cannot even be felt unless abnormally displaced downward into the recto-uterine pouch.

Secondly.—The success of the bimanual examination depends upon the downward pressure, with the external hand displacing the abdominal walls in the direction of the ovary to be palpated, and thus affording a resistant plane, against which the ovary can be felt by the internal hand. The internal hand must be used to invaginate the perineum, which is thus displaced upward into the pelvis. This invagination gives the examining-finger, even though it be a short one, the necessary length. One, often

two inches are thus gained to the palpating-finger. Care must be taken in making the pressure necessary to produce this invagination, not to stiffen all the muscles of the forearm, thus impairing the tactile sense.

The rectum is, of all others, the best avenue for approaching the structures lateral to the uterus, affording, as it does, a wide, open channel throughout the whole length of the pelvis.

Where the structures cannot be reached at once through the rectum, they are brought within easy touch by bringing the uterus and ovaries into an *artificial retroposed* anteflexion, the mechanism of which was carefully described by diagrams.

Dr. Kelly had in this way palpated fibroid tumors on the posterior surface of the uterus near the fundus not as large as a pea.

Thirdly.—The trimanual examination is conducted either by the vagina, or by the rectum and vagina, assisted with the hand above. The peculiarity of this method is an *artificial descensus uteri.* The uterus is grasped with a pair of bullet forceps, and drawn downward until the cervix is seen at the vaginal outlet, and, while an assistant holds it in this position, the gynæcologist uses his hands bimanually. To obviate the employment of an assistant, Dr. Kelly has invented an instrument which he calls the corrugated tenaculum, flattened and roughened so that it can be readily held between the last phalanges of the third and fourth fingers and the ball of the thumb, while the index-finger of the same hand, assisted by the abdominal hand above, is engaged in making a vaginal or rectal examination.

By one or the other of these methods, the uterus, broad ligaments, and ovaries and tubes are within reach of a most thorough and searching examination, revealing at once the smallest abnormities.

HABITUAL ABORTION.

At the meeting of the West London Medico-Chirurgical Society, held January 2, 1891, Dr. Leith Napier read a paper on "Habitual Abortion."

Dr. Napier said the term "habitual abortion" being limited to a recurrence of abortion three or more times, then discussed in an exhaustive manner the various methods of treatment, classifying them under four headings,—1, rest or exercise, insisting on the necessity of absolute rest for at least six days in the month; 2, local cure of uterine disease, chronic endometritis being regarded as the chief cause of abortion, in that retroflexion and other displacements, with atony of the mucous membrane, leucorrhœa, etc., were regarded as resulting from chronic uterine inflammations or congestions; 3, constitutional treatment; and, 4, drug treatment. The value of local treatment was strongly urged, and in estimating the comparative utility of drugs, the prolonged exhibition of mercury, even in cases of a non-specific nature, was extolled above all other therapy; while, as a uterine sedative, viburnum was preferred to any other drug by the author of the paper, in whose practice seventy-seven per cent. of habitual aborters had borne living children after treatment by local methods and drugs.

A discussion ensued, in which Dr. Handfield Jones thought that too great stress had been laid by Dr. Napier on local treatment. He regarded heart-disease as the primary cause of chronic uterine disease and retroflexion, and pointed out that the commonest epoch for abortion was that at which the gravid uterus was striving to rise out of the pelvis, cardiac disease generally causing abortion between the fourth and fifth month, failure of the left ventricle leading to uterine stasis, congestion, and petechial hemorrhages. —*Lancet*, January 10, 1891.

COMPARATIVE ABSORBABILITY OF LARD AND VASELINE BY THE SKIN.

There is a gradually growing tendency to substitute vaseline for lard as an excipient in the preparation of various ointments, and the question at once arises as to whether the skin possesses an equal power for absorbing these two fats. This point has been investigated by Drs. Adam and Schoumacher, whose results are published in the *Repertoire de Pharmacie* for January 20, 1891.

Starting with the attempt to determine as to whether these fats are actually absorbed by the skin, and in what degree, they prepared an ointment with lard containing variable quantities of the hydrochlorate of strychnine, applying this ointment without friction to the shaved head of a dog, applications being made at this point so as to prevent the animal absorbing the poison by licking the surface. They further took the precaution to see that there was no solution of continuity in the skin. They found that an

ointment containing ¾ grain of the strychnine salt to 120 grains of lard produced no toxic symptoms. With an ointment containing 7 grains of the strychnine salt and the same quantity of lard they noted simply slight hyperæsthesia, while in an ointment containing 30 grains of the salt (dog weighing ten pounds) tetanic convulsions were produced in about three minutes and death in twenty minutes, while a dog weighing seventy-two pounds died from the same quantity in twelve hours.

On the other hand, when the ointments were prepared with vaseline, even when it contained 30 grains of the strychnine salt, no symptoms of poisoning whatever were produced. The authors then experimented with atropine, and obtained precisely similar results. With an ointment composed of 120 grains of lard and 15 grains of atropine, there was slight mydriasis produced at the end of six hours, in a dog weighing forty-eight pounds, while the action of a similar ointment prepared with vaseline was absolutely negative. The authors conclude from their experiments that the absorption of ointments made with lard actually takes place, even although it is extremely slight in a dog, and it is necessary to employ doses at least a thousand times larger to produce death than is required to produce the same effect when administered subcutaneously, while in the case of vaseline, when the skin is intact, there is absolutely no absorption of ointments in which this fat serves as an excipient.

LUFF (*Brit. Journ. of Derm.*, June, 1890) summarizes the results of his experiments on the absorption of drugs from ointments with the bladders of goats, as follows: With vaseline and iodide of potassium, exosmose commenced at the end of the first hour; with lard and iodide of potassium, at the end of the ninth hour; with lanolin and iodide of potassium, the result was *nil* up to the twenty-fourth hour. With vaseline and carbolic acid, exosmose commenced at the end of two hours and three-quarters; with lard and carbolic acid, at the end of seven hours; with lanolin and carbolic acid, the result was *nil* at the twenty-fourth hour. With vaseline and resorcin, exosmose commenced at the end of the tenth hour; with lard and resorcin, at the end of the fifteenth hour; with lanolin and resorcin, the result was *nil* at the twenty-fourth hour. Luff concludes that if it is desired to obtain the rapid absorption of medicaments in the circulation, it is better to use vaseline, and that for local therapeutic purposes pomades made with vaseline should be preferred. This latter substance causes the incorporated medicaments to keep for a much longer time.—*British Medical Journal*, January 3, 1891.

DIGITALIS AND STRYCHNINE AS CIRCULATORY STIMULANTS.

Digitalis, caffeine, strophanthus, scoparius, and adonis vernalis constitute a most useful group of agents that exhibit an action upon the circulatory apparatus commonly spoken of as tonic or stimulant; but, when the physiological effects of these drugs are considered critically from the stand-point of their application to diseased states, it will be seen that their use is more limited than is generally supposed. The concomitant actions upon parts and functions of the organism, other than the heart and circulation possessed by each, frequently present a barrier to their employment, even where the circulatory symptoms would seem to indicate their prompt administration. The indications for the use of digitalis in heart-affections are clearly understood, but the reasons for and against its use in many cases of a weakened and failing circulation do not appear to be as firmly established. This view of the question, together with strong arguments for the use of strychnine as a circulatory stimulant, form the basis of a valuable paper published by DR. BRADFUTE, (*New York Med. Journ.*, January 10, 1891), who in the first place maintains that in the class of constitutional diseases, especially those characterized by a continuous high temperature, accompanied by any of the various forms of degenerative change in the organs and muscular system, digitalis is not the remedy, and where these changes affect markedly the cardiac structure it is conspicuously contraindicated. The action of the drug upon the muscular fibre is one of stimulation, followed by an increase in its force power, and, if the fibre is surrounded by or contains within its substance granules or particles of fatty change, it can be readily seen that the indications are for the relief of overwork, and not to compel it to do what it is already physically incapacitated to perform. For example, in typhoid fever the condition just outlined is always present, and the administration of digitalis in doses sufficient to produce even a slight physiological effect cannot fail to do harm; but that this fact is frequently overlooked, and by practitioners of eminence, there is ample evidence. In a[illegible]

tion to the ugly action of digitalis upon diseased heart-tissue, its property of contracting the arterioles, causing a rise in the blood-pressure, increases the total amount of cardiac work necessary to be done, which is so injurious as to result sometimes in practically a paralysis of the entire organ,—a mishap that has occurred after a sudden change from the recumbent to the erect posture in instances of undue exhibition of the drug where there was no interference by disease with the normal function of the heart-fibre. Its influence upon the inhibitory centres also offers an obstacle to its use when the above-mentioned objections may not exist, and on account of this it is well to remember that, as a rule, subject to modifications attendant upon exceptional cases, a weak and slow heart is not amenable to the curative effects of digitalis; rather is it a weak and rapid heart that presents the most favorable opportunity for the display of its peculiar action. Phosphorus-poisoning, typhus and yellow fevers, atheroma, and fatty heart are affections presenting a pathological anatomy contraindicating the employment of digitalis, especially in the last stages of these diseases. Aside from its use in simple heart-disease, unless very skilfully handled, digitalis is only effective in the failing circulation of hemorrhage, shock, and certain acute affections, especially when the cardiac movements are very rapid, where the result desired is a bracing up, as it were, of the general circulatory apparatus until nature has time to recover herself. In shock following head injuries, when the heart is slow, nitroglycerin is the better agent, as it paralyzes the inhibitory centres and dilates the arterioles, thus promoting the activity of the heart and increasing the rapidity of the blood-current. But in these instances there are no degenerative changes in the heart-muscle to negative violent stimulation of the fibre. In acute phthisis, accompanied by an irritative fever and a rapid and sometimes tumultuous heart, digitalis is often very useful, but it is manifestly unsafe to administer it in large doses. The Harveian lecturer of 1890 calls attention to the independence of the systemic and pulmonary circulations, which opens up a new field for the study of pulmonary therapeutics; and it may be that future experiments and observations may preclude the employment of many of the drugs now used in lung-affections; but, under our present knowledge, digitalis is an excellent remedy for the failing heart of continued pulmonary hemorrhage and the gray hepatization stage of pneumonia. In the latter, digitalis does good so long as the heart does not beat below the normal rate; when the pulse drops below 70, some other remedy must be given. In the first and second stages of pneumonia, when active inflammation is going on, digitalis is out of place, as it only causes the heart to pump more blood into an already surcharged area, and can have but little influence over the temperature. In myocarditis, where exudative material is poured out in and around the muscular substance, digitalis adds insult to injury, and the interference with function from the disease is only increased.

From these few remarks it can easily be seen that some of the contraindications that may be present in disease prohibiting the use of digitalis, or a remedy having a similar action, are congestion and inflammatory obstruction in the pulmonary structure; degenerative changes in the muscular system, including the heart; general interruption of the nutritive processes, with accumulation of serum in the tissues; sudden cardiac failure; and all conditions in which the heart-beats are less than normal. Of course no iron-clad rules can be laid down; but if the drug is given in maladies characterized by any of the above-mentioned lesions, it must be used with great care.

In selecting a remedy to combat a failing circulation, all the structural changes and diminished or lost functions must be accurately studied and the influences resulting therefrom duly considered. Without the intelligence accruing from such a consideration of a given case, it is impossible to apply a proper drug, no matter how well known is its action. A thorough knowledge of the normal physiological state of the patient, the pathological changes that have taken place, and the physiological action of the drug is essential to successful therapeutics, and in no instance is a familiarity with these three points more important than in a case of failing circulation.

In those protracted diseases in which this formidable symptom arises, the general condition of the patient may be summarized as follows: The muscular system is weak, flabby, degenerated, and ill nourished; the nervous system is reflexly disorganized; the nerve-conducting paths, chiefly at the periphery, are partially or entirely obstructed, so that tissue sensation and motility are interfered with and vaso-motor paresis is marked, thus checking normal physiological change

in part or even in places completely: the secretory structures are either exhausted—not functionating—or their products are unfit for use; the circulatory apparatus is devoid of tone and strength; and the total area of blood space is increased, owing to paretic dilatation of the smaller vessels. In such a condition here presented the failing circulation is due not so much to the disease *per se* as to vitiated anatomical structure and physiological function, and the indications for treatment are plain. The prime object to be desired is the restoration of the function of the spinal cord, reflex centres, and nerve-endings. A drug that will do this causes a cessation in the destruction of tissue and less waste, thereby minimizing the drain upon the nutritive elements of an already deterioratèd blood; vaso-motor tonus returns, the arterioles and capillaries contract, the superabundant vascular space disappears, and hence a larger amount of blood passes through the heart at each cardiac cycle, stimulating its action and promoting its nutrition.

Strychnine seems to fulfil all the indications in the morbid condition above described, for the action of this remedy being expended upon the spinal cord and this part of the nervous system in conjunction with the sympathetic playing so important a *rôle* in repairing and maintaining the various processes of organic life, it is natural to infer that an intelligent stimulation of its functional activity would, under such circumstances, be a perfectly logical procedure, provided no structural lesion existed in its substance. Clinical experience seems to have established the truth of this reasoning, and Dr. Bradfute extends this evidence with the report of several cases in which symptoms of profound collapse were overcome by the use of strychnine. Its administration must, however, be guided by the effect produced. $\frac{1}{60}$ grain of the sulphate may be given hypodermically every two hours, or oftener if necessary, until there is the desired response. It is interesting to note that in such a condition of the system large amounts are easily borne, especially if the patient has been taking large amounts of alcohol, and the author states he has given as much as four grains in twenty-four hours without producing toxic symptoms. The failing circulation of diphtheria is a typical one for the exhibition of strychnine, for in this affection in its severer forms we have all the conditions present to which its action is antagonistic.

TERPENE IODIDE IN ACUTE DISEASES OF THE LUNGS.

The great disadvantage that the physician has to contend with in the administration of medicines is the changes that they are liable to undergo when taken into the stomach before they finally enter the circulation. It would, therefore, appear that all our remedies should be administered hypodermically, but this method has numerous objections, principally on account of the pain produced and the after-effects which may follow.

In a paper published in the *New York Medical Journal* for February, 1891, Dr. William H. Gregg maintains that terpene iodide enters into the circulation unchanged, and when administered by the stomach acts quite as quickly as if it were administered hypodermically, is a powerful antiseptic, is comparatively harmless, is free from unpleasant after-effects, and the author maintains that in many cases of acute pulmonary disease, more particularly acute congestive pneumonia, and those catarrhal and throat affections which are so often the premonitory symptoms of more serious mischief, the disease may be cut short by the administration of the terpene iodide. In acute affections of the throat he recommends its use in spray, while in other cases it may be given to adults in 10 drop doses, on a teaspoonful of sugar, once or twice a day,—in the morning and at bedtime. The morning dose should be followed by a glass of milk or bouillon, while larger or more frequent doses are apt to produce marked diuretic effects.

THERAPEUTICS OF BENZO-PHENONEID.

According to the Paris correspondent of the *Lancet* for January 10, 1891, M. Galezowski read, on the 27th ult., to the Société de Biologie, a communication on the application in ophthalmology of this new bactericide, discovered by him and M. Petit. They have succeeded in producing, by the decomposition of an aniline dye, a definite compound (tetramethyl-diapsido-benzo-phenoid), which they propose to call by the less formidable name of benzo-phenoneid. This product is endowed with the same powerful microbicide properties as pyoktanin, whose chemical composition is unknown. Soluble in 100 parts of water, the solution, further diluted a hundredfold, is neither caustic nor irritant. Applied locally, it has proved very efficacious in—

causing the rapid and painless cicatrization of ulcers of the cornea which had resisted all other methods of treatment. It has given also good results in purulent keratitis and chronic phlyctenular ophthalmia.

BUTYL CHLORAL IN THE TREATMENT OF FACIAL NEURALGIA.

According to BOCQUILLON (*Journ. de Méd. de Paris*, December 28, 1890) butyl chloral administered internally produces sleep, but without the disadvantage of causing any slowing of the pulse or respiration, and without producing any unfavorable after-effects on the digestive or other organs.

The general evidence seems to indicate that when simple insomnia is to be combated, butyl chloral may prove efficacious, but when an anæsthetic effect is produced, it is of little value. Nevertheless, numerous authors have recommended butyl chloral as a most efficient remedy in the treatment of facial neuralgia, when administered either in the form of solution or in pill form or enemata. Subcutaneous injection should not be employed, as it leads to production of abscess. The author recommends its administration in the form of solution containing 10 parts each of hydrate of butyl chloral and 20 parts of glycerin in 120 parts of distilled water. A teaspoonful of solution contains about fifteen grains of butyl chloral, and may be administered in the dose of 1 or 2 teaspoonfuls daily.

THE ACTION OF THEBAINE, NARCOTINE, AND CERTAIN OF THEIR DERIVATIVES.

With a view to extend our knowledge as to the relation between chemical constitution and physiological action, DR. RALPH STOCKMAN and MR. DOTT have made a number of experiments with various of the opium alkaloids and their results, which prove that the addition or substitution of certain radicals modifies very superficially the original action of the alkaloid (*British Medical Journal*, January 24, 1891). Their experiments commenced with the study of thebaine, which is regarded as a vinyl ether of morphine, just as codeine is the methyl ether. This alkaloid is in many cases the most poisonous of the opium alkaloids, and its physiological action, which closely resembles that of strychnine, with the addition of a distinct narcotic stage, has been well established by Claude Bernard and numerous observers.

The authors' experiments on this alkaloid were principally as to the action of the methylthebaium, which is an addition product formed from thebaine. These experiments show that the physiological action of thebaine is not profoundly altered by the addition of methyl sulphate.

Its tetanizing power is much diminished, while its paralyzing actions on the spinal cord and on motor nerve terminations are greatly increased. Sulphate of methylthebaium may clearly be included in the morphine group, as it induces a narcotic and a tetanic stage. The narcotic stage, like that of thebaine itself, is (in mammals, but not in frogs) extremely ill-defined, its most prominent action, especially in mammalia, being paralysis of motor nerves. But when special methods of investigation are used, its close physiological relationships to thebaine and to morphine can be readily demonstrated.

Similar experiments were also made with narcotine, hydrocotarnine, and cotarnine, the result showing that the chemical derivatives alter their action in degree but not in kind. It thus would seem that the chemical change represented in these three substances does not alter the similarity of their action, but simply affects their dosage, while no radical change of action is produced in them by the chemical change of constitution. This has already been shown to be the case with morphine, and it is also new that the same holds good in other alkaloids, such as cocaine and caffeine.

THE EMPLOYMENT OF PILOCARPINE IN AURAL AFFECTIONS.

The favorable results obtained in a series of cases of severe eye-affections, particularly of acute irido-cyclitis, hemorrhages into the anterior chamber of the eye, and opacity of the vitreous body, induced PROFESSOR POLITZER to give pilocarpine a trial in several cases of labyrinthine affection of syphilitic nature.

The rationale of this method was that in virtue of the rapidly-occurring change of matter, the reabsorption of unorganized exudation products might be brought about. The results of this experiment were so satisfactory that, at the Second Otological Congress, in 1880, he recommended a continued trial of this method in cases of recent affections of the labyrinth. In the *Lancet* for

January 3, 1891, Professor Politzer writes that since that time he has employed subcutaneous injections of pilocarpine in every variety of recent and chronic affections of the labyrinth, the results obtained by himself and others being so favorable that the value of muriated pilocarpine in labyrinth affection must not be underestimated.

He states that he has been in the habit of using a two per cent. solution, 2 drops of which are injected subcutaneously in the forearm, and the dose gradually increased, a drop at a time, to eight. Following rapidly upon the injection, there is a considerably increased secretion of saliva and sweat, which ceases after the lapse of from thirty to forty-five minutes. Rarely it is accompanied by disagreeable symptoms, such as nausea, vomiting, giddiness, fainting, collapse, spasm of the bladder, which can be antagonized by taking from 2 to 3 drops of sulphate of atropine, 7 grains in 160 minims of water. The injections are to be made daily. If, after the lapse of a fortnight, the use of this remedy does not produce an improvement in hearing, it must be regarded as ineffectual and be abandoned. But if, on the other hand, an early and distinct improvement in hearing can be observed, the injections should be continued as long as there is a progressive increase in the faculty of hearing to be elicited upon examination. The period in which the maximum of the hearing distance is attained varies from six to forty days. It is to be noted that the increase in the hearing power is rarely regularly proportional, since it is usually most rapid in the first week or fortnight, while in the subsequent course of the treatment it progresses very slowly. In rarer cases the reverse is true, the hearing power at first increasing slowly and later more rapidly.

Vacillations in the hearing distance are not infrequently observed in the course of treatment, a rapid improvement of several days being promptly followed by a rapid diminution of it, lasting also for some days. The use of subcutaneous injections of pilocarpine, which was at first limited to syphilitic diseases of the labyrinth, was extended later also to those cases of deafness which were found to be dependent upon an affection of the auditory nerve apparatus. This proceeding was indicated by the rapid development of deafness apart from any discoverable anatomical damage in the middle ear, and confirmed by the result of the examination with the tuning-fork, the latter affording important indications for the employment of pilocarpine. If the examination with the tuning-fork proves that in a case of extreme deafness the sound is heard perceptibly longer opposite the ear (ear conduction) than from the mastoid process (positive experiment of Rinne); also that low tones are better perceived by air conduction than high ones; and, lastly, if there is a history of symptoms pointing to the implication of the labyrinth, such as giddiness or total inability to hear the ticking of a watch through the head-bones, then the existence of an affection of the labyrinth is very probable, and it is in such a case that the subcutaneous injection of pilocarpine should be employed.

Dr. Politzer but rarely uses subcutaneous injections of pilocarpine in acute inflammation of the middle ear, although he refers to several cases of acute inflammation of the middle ear in which perforation had not taken place, and where a protracted treatment failed to produce reabsorption of the exudation products lying in the cavity, and where, after three or four subcutaneous injections of pilocarpine, a constant improvement could be observed. Further, the author recommends the subcutaneous injection of pilocarpine in those cases of acute suppuration of the middle ear in which perforation of the tympanic membrane has occurred, and in the course of which deafness supervenes, dependent upon some complication of the labyrinth. Within recent years Professor Politzer writes that he has used muriated pilocarpine, locally injecting from 6 to 8 drops of a two per cent. warm solution through a catheter into the Eustachian tube and tympanic cavity. When it is employed no unpleasant results occur. It is but rarely that salivation and diaphoresis are observed. In chronic catarrh of the middle ear he injects pilocarpine in the tympanic cavity, particularly in those cases where the power of hearing is distinctly improved after inflammation of the middle ear, and where a slight swelling in the Eustachian tube can still be discovered upon examination.

The object of the local application in these cases is to bring about a slight reaction in the mucous membrane of the middle ear, and in this way to cause the absorption of inflammatory products. And, as a matter of fact, in some particular instances, the improvement of hearing following these injections has been more pronounced than that obtained by the use of ten per cent. solutions of soda, which until now have been most f—

quently employed. On the whole, the cases in which the local injections of pilocarpine produce a notable result are but few; in most cases the faculty of hearing does not improve at all, or the improvement is only indifferent and of short duration. Here, too, the treatment must not be extended beyond two or three weeks. It is quite otherwise with the so-called cases of chronic catarrhs in the middle ear, where the adoption of this method of treatment must be deprecated, and in the treatment of dry catarrh of the middle pilocarpine is worthless. So, also, Dr. Politzer insists that in every case of extreme deafness, where the tuning-fork can be heard longer over the mastoid process then opposite the ear, and in addition where low tones are not at all or only faintly perceived through the medium of the ear, while high tones are at the same time very distinctly heard, the subcutaneous application of pilocarpine is very strongly contraindicated. Finally, the author summarizes his conclusions as to the use of pilocarpine in aural troubles as follows:

1. The subcutaneous injections of pilocarpine are particularly indicated in recent affections of the labyrinth, be they of a syphilitic nature or not. In protracted diseases of the labyrinth these injections, if tried, must be abandoned if no improvement results after from ten to fifteen injections.

2. The subcutaneous injections of pilocarpine are but rarely employed in otitis media acuta, where the cavum tympani contains hardened exudative products, which resist reabsorption; moreover, in panotitis gemina diphtheritica, or in other diseases produced by infection.

3. The subcutaneous injections of pilocarpine are decidedly contraindicated in cases of dry sclerotic catarrhs of the middle ear.

4. Injections of several drops of a two per cent. solution of muriated pilocarpine through the catheter into the tympanic cavity are beneficial in some cases of catarrhs connected with swelling and a slight secretion of the mucous membrane of the middle ear, continued from one to three weeks alternately, with inflations or air by Politzer's procedure. The purpose of the present communication is to reduce to a just measure the therapeutic value of the subcutaneous injection of muriated pilocarpine in diseases of the ear, and to draw attention to the frequent abuse which has been made of this remedy for some time past.

POISONING FROM THE INSTILLATION OF HYDROCHLORATE OF COCAINE IN THE MIDDLE EAR.

According to Dr. Ficano (*La Pratique Médicale*, January 6, 1891) accidents due to the absorption of cocaine by the various methods by which this medication may be introduced are not rare. Cases of this nature, which, however, follow the simple dermic application of non-poisonous doses, must be due to idiosyncrasy of the individual and are not to be explained. But few cases are, however, on record where poisonous symptoms have followed its administration through the external ear, even although it must have occurred in numerous instances, for cocaine is probably the first remedy which would now suggest itself to relieve a rebellious earache, even although it is claimed that there is no absorption by the external auditory meatus. When the drum-head is perforated, then, of course, the remedy comes in contact with the mucous surface, and its rapid absorption may then be expected.

The case reported by Dr. Ficano was that of a woman, 43 years of age, who had for some time suffered from intolerable tinnitus, which accompanied a dry otitis media, with diminution of hearing. A few drops of a five per cent. solution of cocaine were introduced into the middle ear by means of a catheter, after use of the Politzer method of insufflation. In a short time vomiting came on with cramps and diarrhœa, a condition which continued for several hours. The symptoms, the author stated, were analogous to those of sea-sickness, and he offers a number of hypothetical explanations as to the way in which these results might be produced. Whether by modifying the quantity of liquid in the middle ear it also modified the audo-labyrinthic tension, or whether, by causing retraction of the tympanic mucous membrane, it causes a compression of the labyrinth through the oval window. Marked muscular inco-ordination was one of the symptoms produced, and the author believes this indicates disturbed equilibrium in the liquids of the internal ear.

THE TREATMENT OF CHRONIC DIARRHŒA BY MEANS OF REST AND MASSAGE.

One of the most notable features in all cases of chronic diarrhœa is the atony of the muscular coat of the stomach and intestines, and one would be almost inclined to believe

that the first tissues to suffer from the malnutrition, resulting from the diminished absorption, are the walls of the gastro-intestinal tract themselves. Probably this condition of affairs is brought about by the development of alkaloids, the products of albuminous decomposition, while to the absorption of these alkaloids may be attributed not only the nervous symptoms, so frequently accompanying chronic diarrhœa, but in some degree the resulting anæmia, fatty degeneration, or emaciation observed in these cases. It is, however, undoubted that in the latter and more chronic developments of the malady there is an atonic and atrophied state of the stomach, involving both the mucous and muscular coats, with consequent diminished absorption and muscular action, so that the food remains in the stomach for a longer period than is necessary for the normal processes of digestion, while the gases resulting therefrom are not subjected to the pressure normally exercised upon them by the heavy muscular coat of both stomach and intestine. As a consequence of this, the action of the gastric juice upon proteids is extended, with the result that digestion continues beyond the normal formation of peptone; and the importance of this point is especially emphasized in a paper entitled "The Treatment of Chronic Diarrhœa by Rest and Massage," published by Mr. A. Symons Eccles, in the *Practitioner* for December, 1890, and January, 1891. He has found that artificially-peptonized milk, if the action of the peptic solution be allowed to continue until there is a distinct bitter taste produced in the milk, be then administered to a patient suffering from chronic diarrhœa, flatulence, intestinal colic, and a loose, offensive discharge almost invariably follow within two or three hours. The duration of gastric digestion may be estimated by what is known as the salol test, which consists in administering salol with the food, and the appearance of salol in the urine may be fairly accurately regarded as indicating the termination of gastric digestion. In cases of chronic diarrhœa, no improvement in body-weight will ordinarily be observed as long as the test fails to give the reaction of salol in the urine within three hours, and the diarrhœa may thus be regarded as the result of diminished absorption in the intestines, and this diminished absorption may be measured by the absorption of salol. Salol is insoluble in acid solutions, while it is readily soluble in alkaline media. The average time in health elapsing between the ingestion of salol and its appearance in the urine is forty-five minutes, and if there be delay in the appearance of salol in the urine it follows that there has been interference in its absorption from the intestine. The premises, therefore, on which the author bases his theory for the use of massage and rest is that, in the first place, there is atony of the stomach, and consequently undue prolongation of the time which food remains in the stomach; there will be in many cases excessive acidity of the gastric secretions, and as a consequence the proteids break down into the leucin, tyrocin, and various other substances more or less of an irritating character, and perhaps lead to the production of poisonous leucomaïnes and ptomaïnes. If any means can be devised to prevent the undue prolongation of the time during which food-stuffs remain in the stomach, and thus to limit the duration of peptic digestion, and so diminish the formation of gas, much may be effected towards the elimination of poisonous alkaloids and the absorption of soluble matters.

In all cases unquestionably *rest* is an important factor, and in this connection the term rest is used in its most comprehensive sense to imply not only the absence of muscular or bodily fatigue, but of all such conditions as cold, hunger, business worry, or domestic anxiety. It may not be so difficult to insure for the patient physical and even physiological rest, but it is not always easy to compel mental quietude, depending, as it does, on external influences frequently beyond the control of patient and physician alike. It is, therefore, of no small importance to urge upon the patient the necessity of placing himself as far as possible under conditions affording the least temptation to indulge in mental or emotional activity, and, without suggesting isolation, it is certainly something in favor of a successful result if the physician can assume a control over the communications between the patient and the outer world, which can thus be modified according to the individual requirements of the case.

So far as physical rest is concerned, the recumbent position in a warm bed must be enjoined. In many cases of chronic diarrhœa it will be found that, after the acute stage has passed, patients have not been enjoined to spend a lengthened period in a recumbent position, and some who have not already reached a condition of serious cachexia are somewhat averse to the rigorous adoption of absolute rest. But so far as the experience of the writer goes, the most assured success

has followed treatment in which, for the first few weeks at all events, the patient has been kept in bed.

An *equable surface temperature* appears to be necessary to the successful treatment of these cases, and until the powers of assimilation have been regained, and thus the nutrition of the body re-established, the most convenient way by which to insure the absence of cold impressions on the skin is to promote the existence and maintenance of a layer of warm air enveloping the surface of the body.

To those for whom the constant drain of frequent relaxation of the bowels for many weeks or months has rendered muscular activity well-nigh impossible, or to be undertaken only with the certain consequence of extreme fatigue and exhaustion, absolute rest under careful supervision is not objected to as irksome. Physical rest and bodily warmth being obtained, so far as external means will allow, the next point is to maintain the physiological rest of the gastro-intestinal canal, and the very existence of diarrhœa is in itself the symptom of pathological unrest, which, however, may be greatly modified by the quality and quantity of the ingesta; but before any particular practice can be initiated it is necessary first to ascertain as soon as possible the nature and locality of the disease from which the patient is suffering, hence the great importance of the scientific test of the state of digestion, and this the author believes we possess in the salol test. Its employment in cases of chronic diarrhœa will confirm the presence of some condition which greatly interferes with the free and rapid assimilation of food. When administered at regular intervals, its excellence as a clinical method of determining the effects of treatment, as well as guiding us in the choice of diet and the employment of remedies, can hardly, in the author's opinion, be overestimated. Frequent manipulation of the abdomen also enters very largely into the author's plan of treatment. The duration of the local manipulations necessarily depend very largely upon the individual requirements of each case, and no mere routine treatment will serve to attain the desired result.

The cases of chronic diarrhœa in which the writer has found massage valuable present certain clinical features sufficiently marked to permit of their classification, the different forms being distinguished from each other by characteristic symptoms. While, with the exception of a few of a less serious type, they all exhibit signs of enfeebled digestion, anæmia, emaciation, and debility, the nature of the evacuations affords a readily distinguishable and rational classification of the malady. In lienteric diarrhœa, for instance, as its name implies, the stools afford undeniable evidence of the passage of food-stuffs which have undergone little or no digestion either in the stomach or intestines, colic and diarrhœa often supervening rapidly after taking a meal, when the predisposition to diarrhœa has existed for some time. In these cases it is often found useful to employ systematic massage of the abdomen before a meal, the manipulations being initiated by somewhat vigorous rubbing over the hypochondriac and epigastric regions, followed by careful kneading over the whole abdominal wall. Much of the success of the treatment appears to depend upon the altered conditions of circulation induced by general corporeal massage. In the chronic diarrhœa depending upon climatic influences the application of massage shortly after meals is indicated, and frequently it is necessary to employ it soon after each meal.

In the earlier stages of the treatment of sprue, the abdomen needs frequent gentle and prolonged manipulations, and these should be employed daily with assiduity until the evacuations cease to exhibit their well-known abnormal character.

Finally, the author sums up his conclusions as to the effects of kneading the abdomen in such cases as follows:

1. The generation of gas within the stomach and intestines is diminished and its expulsion effected.

2. The onward movement of the gastro-intestinal contents is favored.

3. The rapidity of circulation through the visceral lymph- and blood-vessels is increased.

4. The circulation through the liver is improved, and thus the destruction of alkaloids by this organ is promoted. In this connection perhaps not the least valuable effect produced by abdominal massage is the stimulation to more vigorous action of the diaphragm and the consequent automassage, if one may so describe it, produced by the deeper inspirations and abdominal reflexes excited by the earlier manipulations of the abdominal wall.

5. The abdominal vascular area is dilated.

6. The rate of absorption from the intestines is increased.

7. The intestinal nerves are stimulated.

ON THE ACTION OF ATROPINE IN DISEASES OF THE HEART.

DR. CARDARELLI has experimented with atropine in sixty-five cases of various forms of functional cardiac disease, measuring the pulse with the chromograph of Verdin and the arterial pressure with the sphygmomanometer of Basch. His conclusions, which appear to be based on a most careful study, are published in *La France Médicale*, January 23, 1891:

1. Atropine, in doses of $\frac{1}{120}$ to $\frac{1}{82}$ grain, given hypodermically in man, manifests itself first in its action on the heart.

2. The action of atropine on the heart consists in the overcoming to a greater or less degree of the inhibitory influence of the vagus nerve.

3. As a consequence of this paralyzing action on the vagus, there is constant acceleration of the cardiac rhythm, which may be in certain cases accompanied by a slight transitory slowing.

4. Arterial pressure is reduced under the influence of atropine in direct proportion to the acceleration of the rhythm.

The author concludes with the statement that, when a clinician cannot use atropine in slight forms of irritation of the pneumogastric, in which there is no slowing of the pulse, it will be, nevertheless, a great error not to prescribe atropine in cases where a permanently slow pulse is accompanied by epileptiform vertigo, and, above all, by syncope.

THERAPEUTIC ACTION OF CAMPHORIC ACID.

The therapeutic value of camphoric acid in acute and chronic catarrhs of the respiratory mucous membrane, acute and chronic cystitis, and in the night-sweats of phthisis has recently been the subject of study in the medical clinic at Griefswalder, under the direction of DR. HARTLEIB, whose results are furnished in the *Centralblatt für Klinische Medicin*, No. 5, 1891.

The drug was administered in the form of an alcoholic solution, 1 part of camphoric acid in 11 of alcohol, in glycerin solution, and in aqueous solution with the addition of bicarbonate of sodium. In angina of various forms, one-half to one per cent. solutions were employed as a gargle and as a local application, but the remedy appeared to possess no advantage over the drugs used for the same purpose in chronic bronchitis and in pulmonary tuberculosis, though some patients claimed to receive some relief from its employment. Very favorable results, however, are claimed to have followed its employment in cases of chronic cystitis, three out of five being absolutely cured within three to six weeks, the remedy in these cases being employed in one-half per cent. solution, with which the bladder was washed out twice daily. Stronger solutions than one per cent. cause too much irritation and should not be used, although the author recommends the plan of washing the bladder with eight grains, given three times daily. It also produces more favorable results in the treatment of the night-sweats of numerous phthisical cases, while unfavorable after-effects were never noted.

BROMISM AND INTESTINAL ANTISEPSIS.

In a note read before the Société de Biologie, at the meeting held January 24, 1891, DR. FERRET continues the study of the influence of intestinal antisepsis on bromism, already referred to in a previous number of the GAZETTE (*La Médecine Moderne*, February 5, 1891). He confirms the statement already mentioned that not only may one with sufficient doses of naphthol and salicylate of bismuth prevent cutaneous manifestations of bromism, but one may by these means even cure an eruption, if already so produced. He also maintains that borax also may produce eruptions quite as serious as those which follow the administration of large amounts of bromides, and that such eruptions may be likewise treated and cured by the same method. He believes that his experience has demonstrated that this method should be generally employed, and always with a prospect of success in the treatment of the cutaneous manifestations which follow the ingestion of drugs.

Reviews.

PRINCIPLES OF SURGERY. By N. Senn, M.D., Ph.D. Philadelphia and London: F. A. Davis, 1890.

Our author has well said in his preface, that "the successful study and practice of any branch of the healing art require a thorough knowledge of the principles upon which it is based." How many mistakes might have

been avoided, how much suffering might have been saved, if a more thorough knowledge of the principles which govern our art had been learned rather than the too hasty desire to acquire a knowledge of the practical part of surgery! Not that the latter is to be underrated, but that its application would be so much more advantageously utilized if the former was more fully understood. The surgeon who is able to answer the why and wherefore is the one who may be relied upon, and Professor Senn has well expressed it as follows: "The student who has mastered the principles of surgery will have no difficulty in applying his knowledge in practice, while the one who has burdened his memory with numerous details, to meet special indications, is always at loss in making prompt and judicious use of his therapeutic resources when confronted by rare lesions or unexpected emergencies."

During the past decade or two the number of American and English works which treat of surgical diseases have been not a few, and their excellency cannot be questioned. In no branch of medicine has there been such progress made, and the results obtained have been far beyond the expectations of the most sanguine; yet, with it all, there has been a more or less deficiency, even in the most recent of these works, in the fundamental principles which are the true reasons for the progress and success of the art and science of surgery. Our etiology and pathology of surgical diseases at the present time cannot be compared with that of fifteen or twenty years ago. New etiological factors have been discovered, and new pathological indications have been demonstrated; new names have been added, and new therapeutics are called for; indeed, the surgeon who has not been a constant student of his profession will scarcely be able to comprehend the recent literature which treats of the art and science of surgery.

As an evidence of the change which has taken place in the use of new terms to express the progress made in surgery, we will refer to Professor Senn's first chapter, which treats of "Regeneration." This is defined as "a multitude of processes, which are intended to repair the normal physiological waste of the tissues in the living body, or to restore tissues lost by injury or disease." Regeneration is not inflammation, and they are said to be entirely different processes. "An ideal regeneration takes place without inflammation, provided the seat of injury or tissue-destruction remains aseptic,—that is, free from pathogenic microbes."

The regeneration or reparative process, in the healing of wounds, is stated to "consist of homologous cell-development, and the new tissue resembles, anatomically and physiologically, the fixed cells from which it is produced,"—this is to say, epithelial cells are only developed from epithelial cells, nerve-tissue only from nerve-cells, and the same law is universal throughout the entire body. It is the fixed cells of the tissues only which take part in the healing of wounds. The immediate or direct union of wounds is not admitted by our author. He writes: "A certain amount of coagulation necrosis takes place in every wound, and the material thus formed serves as a cement-substance, which temporarily glues the parts together." The healing of wounds by primary intention is considered always to occur whenever there is no suppuration, either without or with visible granulation tissue. And, again, "All wounds which heal without suppuration heal without inflammation. All inflamed wounds suppurate; the reparative process is delayed until the inflammation has subsided." These principles being admitted, it follows that the proper classification of the healing of wounds is such as Professor Senn makes,—viz., "(1) aseptic wounds and (2) infected wounds." An aseptic wound is said to be one "not contaminated with pathogenic micro-organisms,—heals without inflammation." The *rôle* which the leucocytes play in the healing of an aseptic wound is that they "serve a useful purpose in the temporary closure of divided capillary vessels, and in the formation of temporary cement-substance, by which the surfaces of the wound are mechanically glued together; and, lastly, as food for the embryonal cells; *but they take no active part in the production of new tissue.*"

In order to comprehend the healing of wounds, and the process of regeneration, it is very evident that the histological changes which take place in the tissues must be understood, and the laws which govern the formation of new tissue are to be remembered; therefore, a study of the multiplication of cells, and the process by which it is accomplished is imperative. In this connection the author has given a description of karyokinesis, which should be thoroughly mastered by the student. While admitting that the direct cell-division may at times be a method of cell-multiplication, in the healing of wounds, yet it is the indirect cell-division, or karyo-

kinetic process, which is most frequently met with; and, further, wherever the latter process is seen, "it is positive evidence that the fixed tissue-cells are the seat of tissue-proliferation, and that wounds are healed and defects repaired exclusively by this method of cell-formation."

In the treatment of wounds, from the earliest times until the present period, it has been the great aim of all surgeons to obtain their healing by the process of union by first intention. Professor Senn gives us some most excellent, as he terms them, "positive indications in the treatment of wounds, with special reference to secure union by first intention." "Absolute asepsis," he says, "can only be secured by strictest antiseptic measures. Surgical cleanliness is more than ordinary cleanliness." All bleeding in a wound is thought to be objectionable, and therefore most careful hæmostasis should be observed. Accurate suturing, not only of the edges of the wound, but muscle to muscle, nerve to nerve, tendon to tendon, is an indication of great importance, and it should be most carefully done; all cavities are to be closed and as perfect approximation as possible is to be sought after. Drainage is very properly said to be necessary only when the surgeon is at all in doubt as to whether the wound is aseptic or not. If aseptic, drainage is unnecessary and may be dispensed with; physiological rest, in the after-treatment of a wound, is looked upon as of the greatest importance, and it should be secured as far as possible.

The "Regeneration of Different Tissues" is considered in chapter ii., and Professor Senn here more emphatically gives his views in regard to the *rôle* played by the different cells. He writes: "No positive proof has yet been furnished that the leucocytes, or any of the cellular elements of the blood, take any active part in the restoration of the lost parts." It is the homologous cell-proliferation which seems more rational than to suppose that the indifferent white blood-corpuscle is ever converted into the tissue-cells of a part. The organization of the thrombus, in a ligated blood-vessel, by the histological elements of the thrombus, is denied. Thus "the blood-clot always occupies only a passive *rôle*, and, if present, is only in the way of a speedy definitive closure, which invariably is effected by proliferation from the fixed cells of the vessel-wall." In the regeneration of bone it is the medullary tissue of the osseous structure which produces the permanent callus and the cell-proliferation from the periosteum which forms the provisional callus. In other words, bone is regenerated from bone-cells only; but the cells of the periosteum are capable of bone formation, yet such formations are not permanent. This has been shown by the investigations of Ollier, who found that the transplanted periosteum was first changed into cartilage, which was later transformed into bone, but such bone formations disappeared again, unless they formed in a place where bone normally existed.

Chapters iii. and iv. treat of "Inflammation." True inflammation is believed to be always caused by the presence of one or more kinds of pathogenic microbes. It is the series of histological changes which occur in the living body from the presence and action of specific micro-organisms; while, on the contrary, regeneration is the histological changes which take place in the tissues, which have been primarily in an aseptic condition, or have been rendered so after the inflammation has subsided. Professor Senn has wisely not attempted to make a definition to express what is meant by the term inflammation. Our present knowledge of the causes, the anatomical changes, and the pathological characteristics of the process he does not think sufficient to warrant the attempt. "The conception of the true nature of inflammation, for the present, at least, must remain symptomatic." These chapters on inflammation are full of most interesting and important questions, both for the student and surgeon. Space, however, will not permit us to dwell too long upon them. They should be carefully read and thoroughly understood by all students of medicine. We will call attention to the section on "Phagocytosis," which is the process by which leucocytes and other cells remove dead material, and destroy or digest pathogenic micro-organisms. This process has not been accepted by all writers, and, indeed, it has met with considerable opposition. As a theory, it has much to recommend it. As a fact, it has not yet been truly established, but it has many arguments in its favor. The conclusion given by our author we think quite just. He writes: "From a practical stand-point it can be said that all therapeutic measures which influence favorably the process of phagocytosis, in the broadest meaning of the word, are calculated to exert a potent influence in arresting or limiting infective processes."

Inflammation not being considered a disease *per se*, but rather an effort on the part of th-

organism and affected tissues to eliminate, or rather render inert, the primary cause, its treatment must necessarily be symptomatic. In surgery, it is the prevention of the action of the cause which is to receive the greatest attention, and we have seen that the cause is always some form of pathogenic microbe; therefore prophylactic treatment by strict antiseptic precautions is the fundamental principle which is to govern us in our surgical practice.

The elucidation of the subject "Pathogenic Bacteria" is most ably and clearly given by Professor Senn, in so far as it is connected with surgical pathology. The necessity for a study of this subject is only too evident; indeed, when it is considered that most forms of inflammation are due to some specific micro-organism, a knowledge of their history, their method of development, and the means necessary for their detection becomes absolutely essential.

Inflammation being always due to some form of micro-organism, one of its terminations is in suppuration, and the latter is defined by Professor Senn as "the process by which the morphological elements of the inflammatory product, the leucocytes and embryonal cells are converted into pus-corpuscles." This change of these cells into pus-corpuscles is stated to be "caused by the action upon the tissues of specific micro-organisms,—the pus-microbes,—and the transformation of leucocytes and embryonal cells into pus-corpuscles is accomplished by the same cause." From this it is seen that the indirect cause of suppuration is thought to be the condition produced in the tissues by the inflammation; the direct cause is the presence of pus-microbes, which act on the leucocytes and embryonal cells, transforming them into pus-corpuscles. The consideration of the important question as to whether it is possible to have suppuration without the presence of pus-microbes, is answered by our author in the affirmative; but such a form of suppuration is termed chemical, and differs from clinical suppuration in that it is a sterile and aseptic pus, and is not progressive in its action. On the other hand, clinical pus is due to the presence of pus-microbes; "they are the immediate and essential cause of suppurative inflammation." In regard to the *rôle* played by the ptomaïnes, as an etiological factor in suppuration, the author, we think, very justly says, "To the practical surgeon it is immaterial to know whether the transformation of leucocytes and embryonal cells is brought about by the direct action of pus-microbes, or by the ptomaïnes which they produce in the tissues."

Septicæmia is said to be closely related to pyæmia, both clinically and etiologically, and it is thought to be due to the introduction into the circulation of septic micro-organisms or their ptomaïnes. From a study of the bacteriological researches of many investigators, Professor Senn concludes "that the essential bacterial cause of septicæmia is variable, and that the disease represents a general febrile condition, which is brought about by the absorption from a local focus of different toxines from as many different microbes;" and again he writes, "This disease can be produced by any of the microbes, which, after their introduction into the organism, have the capacity to produce a sufficient quantity of phlogistic ptomaïnes to give rise to septic intoxication."

The fact that bacteriological investigations have demonstrated the presence of some of the forms of pus-microbes, in all cases of pyæmia, justifies the definition of this disease as an affection "caused by the entrance into the circulation of pus or some of its component parts." Any of the pyogenic microbes are said to have the power of determining an attack of pyæmia, provided they are present in sufficient quantity in the blood. It is not the kind of pus-microbes which have caused the primary suppuration that gives rise to the pyæmia, but it depends more upon the location and anatomical structure of the tissues in which the primary infection has occurred. The cause of pyæmia being now admitted,—viz., pus infection,—its treatment resolves itself into prophylactic measures. "The prevention of suppuration in a wound furnishes absolute protection against pyæmia."

The remaining chapters of the book treat of "Erysipelas," "Tetanus," "Hydrophobia," "Tuberculosis," "Actinomycosis," "Anthrax," and "Glanders." In concluding our notice of Professor Senn's book, we feel that we have not done him justice in the above brief review. The work is a most valuable one; in fact, we are inclined to consider it the most important publication, in connection with surgery, that has been issued for some years past. No surgeon, no matter how great his experience, can read the book without being better able to practise his profession, and no student of medicine should be permitted to assume the duties of a surgeon without having thoroughly mastered the principles here given. J. H. C. S.

MEMORIAL SKETCHES OF DR. MOSES GUNN. By his wife.
Chicago: W. T. Keener, 1890.

The history of a noble man and enthusiastic surgeon, faithfully depicted by his wife and friends, consisting largely of extracts from his letters, delightfully woven together so as to make a charming story without a break. His letters from the seat of war, especially during the Peninsular campaign under McClellan, when he acted as surgeon to the Fifth Michigan Regiment, are exceedingly interesting, and his enthusiastic admiration for the commander-in-chief, with his affection for the President, are typical of the feelings of the entire army during this exciting time. His letters from Europe during the summer of 1879, and again in 1881, are well written and amusing. Dr. Gunn was for many years Professor of Surgery in Ann Arbor University, and was, besides, an active surgeon.

These sketches will be found of interest to the general reader, as well as to his friends and to the medical profession at large.

THE PATIENT'S RECORD, FOR THE USE OF PHYSICIANS AND NURSES. Compiled by Agnes S. Brennan.
New York and London: G. P. Putnam & Sons, 1890.

This book is ruled so that an exact record can be kept of the temperature, pulse, respiration, medicine, nourishment, stimulants, amount of urine passed, defecation, the time of day on which the observations were made, remarks on the case, and the doctor's orders from day to day, and will be found useful in the sick-room. It also contains a number of temperature charts for the use of physicians. The paper is good and the lines distinct. It is bound in boards, with leather back and edges, and on the back cover is a leather loop to hold a pencil.

TRANSACTIONS OF THE MEDICAL AND CHIRURGICAL FACULTY OF THE STATE OF MARYLAND. NINETY-SECOND ANNUAL SESSION, APRIL, 1890.
Baltimore: Griffin, Curley & Co., 1890.

The transactions of the ninety-second session contain several valuable papers, which will repay the reading, among which may be cited "Some Practical Points in Hernia," by R. W. Johnson; "Double Popliteal Aneurism cured by Ligature," by J. E. Michael; "Rachitis considered in Regard to some of its Symptoms," by William Lee; and "The Early Detection of Pulmonary Consumption," by William Canfield. In this paper Dr. Canfield demonstrates the clinical importance of the early recognition of the disease by examining the sputa for the bacillus tuberculosis after it has been stained by a rapid process. He prefers a coloring fluid of fuchsine (1 part), absolute alcohol (10 parts), and a five per cent. solution of carbolic acid (100 parts). The clinical value of the early detection of tuberculosis is undoubted, and will become more so if the "Koch lymph" should prove a specific in this disease.

In addition to other papers of value and the minutes of the meeting, reports of various committees, and the papers presented to the various sections will prove interesting.

ESSENTIALS OF PRACTICE OF PHARMACY. By Lucius E. Sayre, Ph.G., etc.
Philadelphia: W. B. Saunders, 1890.

This is No. 18 of Saunder's Question Compends, and, like all of its predecessors, is arranged in the form of questions and answers, which, while it is apt to catch the eye of the student, is nevertheless of more than doubtful utility. After an experience of many years in medical teaching, we are fully convinced that books of this kind, far from being of advantage, are really harmful to the majority of students, who, instead of using them as they should be used,—viz., to review knowledge already acquired,—study them, to the exclusion of the larger and consequently more thorough text-books. As, however, there is a demand for such books, the publishers have been fortunate thus far in securing good works.

The book before us is an admirable example of this series, and in one hundred and seventy-two pages contains a concise, clear statement of the subject.

TEXT-BOOK OF MATERIA MEDICA FOR NURSES. By Lavinia L. Dock.
New York and London: G. P. Putnam & Sons, 1890.

This book contains an outline of the source and composition of drugs, their physiological action, symptoms of poisoning and antidotes, and some practical points on their administration, and is intended for the use of nurses in the sick-room. It consists of one hundred and ninety-three pages, and is concisely written, the statements being clear and the arrangement good, following, as it does, that of Brunton and Bruce.

A few mistakes are found in the book, as for instance, on page 28, alum is called aluminum instead of alumen. On page 42

ferri oxidum hydratum cum magnesiâ is spoken of as the hydrated sesquioxide of iron and hydrated magnesia, a term which is hardly compatible with the ordinary chemical nomenclature of the present day.

In addition to the Materia Medica, the book contains an appendix, showing the relation of minims to drops in certain medicinal liquids.

A MANUAL OF WEIGHTS AND MEASURES, WITH RULES AND TABLES. By Oscar Oldberg, Ph.D. Third edition. Revised.
Chicago: W. T. Keener, 1890.

That this little work should have passed through three editions in the space of five years would seem to us in itself a sufficient indication of its worth. The present edition "is supposed to be free from errors, and its value has been enhanced by the addition of several tables."

A CLINICAL STUDY OF DISEASES OF THE KIDNEYS. By Clifford Mitchell, A.M., M.D.
Chicago: W. T. Keener, 1891.

Any one who wishes to become an expert in the chemical and microscopical examination of the urine cannot do better than to study the first ninety-seven pages of this book, which deal especially with this subject and their application to the diagnosis of disease. The remainder is occupied with the prognosis and therapeutics of renal diseases, and a description of the different diseases of the kidneys, with their complications and treatment. A number of excellent tables have been introduced throughout the work, which, together with the illustrations, enhance its value. It is well indexed, and in such a manner that the principal references to any subject may be readily found. It is printed in large, clear type, on good paper, and is well bound in cloth.

A LABORATORY MANUAL OF CHEMISTRY, MEDICAL AND PHARMACEUTICAL. By Oscar Oldberg, Ph.D., and John H. Long, Sc.D. With original illustrations. Second edition, revised and enlarged.
Chicago: W. T. Keener, 1891.

The second edition of this book is a great improvement on the first, which appeared only three years ago. The authors, in the preface, state that typographical errors, as far as discovered, have been corrected, and this appears to have been the case to such an extent that, on careful examination, we have not been able to find any misprints or misstatements in the work.

It is divided into three parts. Part I. contains the chemical elements, with a short, succinct description of the non-metals and the metals, with their tests. Part II. is synthetical chemistry, devoted to inorganic chemistry and preparations with organic acids. Part III. is analytical chemistry, and, in its various means of testing compounds in actual practice, together with volumetric analyses and urinary analysis, is well considered, and condensed into less than one hundred pages. At the end of the book are inserted five plates, consisting of six figures each, in which the principal microscopical ingredients of the urine—normal and abnormal—are well depicted. The work is well calculated to fulfil the object for which it is intended.

A COMPENDIUM OF BOTANIC MATERIA MEDICA. By Samuel Waggaman, M.D., Ph.D., etc.
Washington, D. C.: W. H. Morrison, 1891.

Professor Waggaman says, "I have merely gleaned from the standard authors the material which I have thus arranged, in what I hope will prove an attractive form. This book is not expected to supply the place of the larger works on the same subject. It is merely intended to simplify the labors of the student, or prove an easy reference for those to whom the subject-matter is already familiar." These objects are fully carried out, and the principles of medical botany are well and simply stated. It will be useful to students of pharmacy, for whom especially it is intended. The pages are rather too closely printed, and the type is small, but fortunately clear.

THE PHYSICIAN'S VISITING-LIST FOR 1891.
Philadelphia: P. Blakiston, Son & Co.

The Physician's Visiting-List is too well known to require an extended notice. Besides the ordinary visiting-list, it contains an almanac for 1891 and 1892, Marshall Hall's ready method in asphyxia, Sylvester's method in artificial respiration, table of poisons and their antidotes, metric or decimal system of weights and measures, posological tables, and a list of new remedies, aids to diagnosis and treatment of diseases of the eye, and much other matter of importance to the general practitioner. It has also a neat pocket for prescription-blanks and a pencil.

Correspondence.

BERLIN.

(From our Special Correspondent.)

The readers of this journal, if they receive from Berlin only reports of the new treatment of tuberculosis, will be very apt to cry out, "Is there no end to Koch?" I do not intend to review the numerous papers that have already appeared upon the subject, and it is still too soon to pass final judgment on the matter. Virchow's statements at the time of the discussion at the meeting of the Berlin Medical Society have caused, as the newspapers show, much surprise far beyond the boundaries of Germany. He then showed that the injections may produce an increase of the tuberculous process. He has made a longer report on the healing of tubercle, in which he shows that absorption of tuberculous matter cannot occur equally in different parts of the body, since under ordinary conditions tubercle behaves differently in the liver than in the intestines, the larynx, or the lung.

Last evening a discussion was begun at the meeting of the Verein für Innere Medicine on this important matter. Dr. Thorner made the opening remarks, which have been elsewhere published, and which contained nothing of marked importance. Dr. Klemperer, assistant in Professor Leyden's medical clinic, spoke of the alterations in metabolism which occur in patients treated by Koch's method. He found that, after the third week, no increase of the metabolism of albuminates could be proven. The organism, therefore, becomes accustomed to the remedy, which does not happen, so far as we know, in the case of any other toxine.

Surely these experimental results will tend to again increase the trust in the method which had been strongly shaken by Virchow's publications. Never have there been such contrary opinions concerning a remedy as have been given on this question. We hope and wish, in the interest of suffering humanity, that the discussion may progress quietly and without passion, and that the many dark places may be made light. It is especially important at the present time, when so many are using the method, that, on the one hand, there should not be too much enthusiasm, nor, on the other hand, should pessimistic reports frighten physicians and the laity concerning a method that certainly in many cases has given excellent results.

The building in the Charité intended for Koch is so nearly completed that very soon it will be ready to be occupied, and in the mean while the investigations are being carried out under the personal direction of Professor Koch, who, at the present time, is temporarily absent, in the town hospital Moabit.

The police department of Berlin, which has control of all matters of interest to the maintenance of public hygiene, has been led by the discoveries and studies concerning tuberculosis to issue important orders. Henceforth fatal cases of pulmonary phthisis must be reported to the police, while heretofore physicians were required to report all cases of cholera, small-pox, typhoid fever, typhus fever, measles, scarlatina, diphtheria, and puerperal fever, but not phthisis. At the end of the illness everything in the sick-room, including the walls, are properly and thoroughly disinfected. We hope that this measure may be of assistance in overcoming such a terrible enemy to mankind as phthisis, and would recommend other cities to follow the example set by Berlin.

Some investigations have already been made as to the effects of Koch's treatment in cattle affected with tuberculosis, and probably positive and successful results will follow later.

HYPOSULPHITE OF SODIUM AND SILVER IN ATAXIA.

To the Editor of the THERAPEUTIC GAZETTE:

DEAR SIR:—Having a case of locomotor ataxia to treat, and fearing the danger of argyria from the nitrate of silver, I was induced to use the hyposulphite of sodium and silver, thiosulphate of sodium and silver, from a report published by Curci, in the *Medical News*, July 10, 1886, wherein it was claimed this double salt "did not coagulate the albuminoids, is very soluble in water, is not caustic, is diffusible, promptly absorbed by mucous membrane and connective tissue. Its taste is sweet, slightly nauseous. Should be given fasting or hypodermically, by mouth from 5 to 20 centigrammes daily, or 1 to 5 centigrammes daily. Its action is quickly obtained; the danger of argyria is avoided."

My patient was a lady, past middle life,

and her trouble had been slow in coming on. The electric-like pains had been treated as neuralgia and rheumatism; the gastric trouble, as dyspepsia, with pepsin and nux vomica; while the difficulty in locomotion was attributed to the rheumatism. She came under my care early in 1886. The first symptom she then complained of was the difficulty she had just experienced in coming up the stairs, owing to the darkness and some stiffness in her limbs. Though she could walk from her house to the gate at night with considerable certainty, as she was familiar with the locality, yet if she stepped off the walk she would be compelled to sit down, because on the ground she could not get her bearings; that if she did not get back on to the walk, she would be compelled to crawl to the house, for on the ground she felt an uncertainty about her equilibrium. She does not walk on her heels, bringing the sole down with a flap; she walks slightly bent forward, that she may watch where she steps, for a very small obstacle, if stepped upon, is sufficient to cause her to fall. Though she stands with her eyes closed, yet there is a slight swaying motion of the body, such a feeling that she might fall, she does not like to try it. She stands and walks wide; the foot is not carried directly forward with a good knee action, but is held rather stiff and swung around.

She took at first ergot, to relieve some spinal congestion that troubled her mornings. Belladonna, she thought, gave little relief to the bladder-trouble (paralysis of sphincter), and annoyed her by the dryness it caused in the mouth.

She has taken the sodium and silver salt at intervals since 1887 or earlier, as high as 15 centigrammes (2⅜ grains) a day, in all four or five drachms, and has lately commenced on another drachm. Soon after commencing the use of the silver salt her gait improved, and she walked with more ease and spring. She says the silver helped the pains in her limbs, that she could walk better after taking it, but it did not help her bladder-trouble.

Suspension, which she uses at home, she claims greatly helps the bladder-trouble; the only thing that ever did.

With the silver salt and suspension, she says, she can get along very well, if her household work is not too great; that without them she could hardly get along at all.

Very truly yours,

A. RADCLIFFE, M.D.

BUSHNELL, ILL.

Notes and Queries.

A NEW SOURCE OF ARSENIC-POISONING.

In the *Boston Medical and Surgical Journal* for February 19, 1891, DR. WILLIAM N. SWIFT writes that he recently had under his care a child, 6 years of age, who, at the age of two, occasionally suffered from constipation, with offensive breath and coated tongue. He was somewhat salivated, and had at times a few superficial ulcers on the mucous surface of the lips, gums, or tongue. No explanation could be found for this condition, except that he always had a good appetite, and was in the habit, unless watched carefully, of bolting his food. His diet had always been regulated with much care.

In January, 1890, he had the epidemic influenza, and as he was at its onset in one of his debilitated conditions, he was very much pulled down by the illness. During the summer he was in the country, and was perfectly well. When he returned home, he began, in a short time, to look badly. He became anæmic, began to lose weight, and his muscles became soft and flabby. He was constipated. His tongue was coated, and the whole mucous membrane of the mouth became soft and spongy. His breath was offensive. He complained of weakness and occasional cramps in the muscles of the legs when walking. He had to be taken up two or three times at night to prevent him from urinating in bed, and he wet his clothes often during the day.

The plumbing of the house was examined, and found free from any defect. The boy's urine was then analyzed, and arsenic was found. No quantitative test was made, but the amount was considerable. The question was then, What the source of the arsenic might be? The carpet, curtains, and furniture-covering were analyzed, and found free from arsenic. A border and dado of a pictorial paper about the room was known not to contain arsenic. The wall between these was painted a peacock blue, and this paint was found loaded with arsenic. The painter, who had painted the room six years ago, said the color was obtained by mixing Prussian blue and a green. The green pigment undoubtedly contained arsenic. The paint was mixed with lead and oil, and had a smooth, glazed surface.

The patient was sent inland for a change, and he began to improve at once. Since

eliminating the source of poisoning, the boy has been perfectly well.

In looking back on the different attacks that the child had had, during the four years that he had been exposed to the poison, it was noticed that whenever he had been away from home and had come back to this room, the symptoms of debility and stomatitis had developed; but that, after living in the room for some time, he seemed to become used to the poison, and improved somewhat.

The case is interesting, because the evidence seems conclusive as to the cause of the symptoms, the obscurity of the symptoms themselves, and the unusual source of the arsenic, showing that paint should be analyzed, as well as paper and furnishings, in sleeping-rooms.

CARPAINE.

A new alkaloid has recently been detected in papaw-leaves by M. GRESHOFF, of the Chemico-Pharmacological Laboratory at Buitenzorg, in Java. It was obtained by digesting the powdered leaves in spirit acidulated with acetic acid, removing the spirit by distillation, and treating the resulting extract with water so as to leave behind resin and chlorophyll. The aqueous solution was then shaken repeatedly with ether, and carbonate of sodium was added until an alkaline reaction was evident. The precipitate thus obtained was readily soluble in ether, and on evaporation of the ether the "carpaine" was obtained in colorless rosettes of crystals to the extent of about .25 per cent. of the leaves employed. Although the freshly-precipitated alkaloid is readily soluble in ether, when once crystallized it redissolves but slowly, so that the crystals can be purified and rendered perfectly white by washing with a little ether, but the percentage obtained is thus reduced to .15 per cent. On a large scale, the lime and petroleum method gives very good results, about .19 per cent., and would probably be preferred on the score of expense. Comparative experiments made on the young and old leaves, freed from the stalks, show that the old leaves afford when dried .072 per cent. of the alkaloid, and young leaves .25 per cent., and that, on an average, a papaw plant can be calculated to afford thirty grammes of the alkaloid per year from the leaves. The hydrochlorate of carpaine, which contains about eighty-two per cent. of the pure alkaloid, is freely soluble in water. As yet comparatively little is known of the physiological action of the alkaloid. It appears, however, to act more especially upon the heart, slowing its action. The lethal dose for a fowl of five hundred grammes (one pound) weight was found to be about 200 milligrammes (three grains). In a fowl of three hundred and fifty grammes weight, no poisonous symptoms were produced with 50 milligrammes of the alkaloid; with 100 milligrammes, symptoms of poisoning occurred in ten minutes after injection into the breast muscles, but after twenty-five minutes the animal recovered its normal condition. The bird lay on its side, and breathed deeply in a jerky manner, and showed slight convulsive movements of the whole body, but no irritability was noticed. Further observations are necessary to determine the usefulness or otherwise of the alkaloid in medicine. Should it prove of utility, there can be no difficulty in obtaining it in almost unlimited quantity and in a definite crystalline condition. The alkaloid is easily precipitated from its solutions by the alkaloid reagents. The most delicate reaction is with Mayer's reagent,—iodo-iodide of potassium,—which, in a solution of 1 in 300,000, gives a turbidity, and in 80,000 parts an evident precipitate; phosphomolybdate of ammonium has its limit of reaction at 1 in 75,000 parts, picric acid at 1 in 30,000, and chloride of gold at 1 in 25,000. The alkaloid has a bitter taste, which is perceptible even in a solution of 1 part in 100,000.—*Pharmaceutical Journal and Transactions*, December 27, 1890.

ACTIVE PRINCIPLE OF CASTOR OIL.

The identity of the active principle of castor oil has been for many years a subject of much dispute, and the opinion of Buchheim that the castor oil contains no especial ready-formed irritant, but that its action is due to the liberation of ricinoleic acid, which itself possesses the properties of a "scharfer stoff," has been repudiated by Husemann, Boehm, Brunton, Schmiedeberg, and others. On the other hand, the laxative properties of the oil cannot be due to a poison producing gastro-enteritis, contained in the ricinus seeds, and called by Schmiedeberg ricinon, since the latter is destroyed at the temperature of boiling water, under which treatment the activity of the castor oil is not affected, as witnessed by its method of preparation both in the United States and in the East Indies, as well as by direct experiment. By comparison of the

purgative action of ricinoleic acid and its synthetically regenerated glyceride with that of the natural glyceride occurring in castor oil, PROFESSOR HANS MEYER (*Archiv für Experimentelle Pathologie und Pharmakologie*, November, p. 145) has obtained results that substantially support Buchheim's assertion. The ricinoleic acid used in his experiments was prepared as calcium salt from castor oil, and set free after complete purification of the salt by recrystallization from alcohol. The acid possesses a specific gravity of .9451 at 15° C., gives good crystalline barium, zinc, and cadmium salts, and may be converted into the glyceride by heating with glycerin at 280° to 300° C. in a stream of carbonic acid gas. In experiments upon cats and human patients, both the pure acid and the synthetic glyceride appeared to be even more active than the ordinary oil. As, however, the non-activity of the isomeric elaidic acid and elaidin, produced by the action of nitrous acid, still suggested that the active principle of castor oil might be an extremely powerful body not removed from ricinoleic acid by recrystallization, but destroyed by nitrous acid, Professor Meyer carried his investigations further. Arguing that the different physical conditions of the isomerides might account for the difference in purgative action, he administered ricinelaidic acid and ricinelaidin mixed with yolk of egg or milk or dissolved in olive oil. The results showed that the ricinoleic acid had not lost the characteristic property of castor oil through the nitrous acid treatment, but that the apparent non-activity of the elaidic acid is due to its solid condition and higher melting-point (50° C.), which hinder its rapid distribution in the intestines. This is a necessary condition for its successful employment, since the stimulating influence of the ricinoleic acid upon the mucous membrane of the intestines is of short duration and disappears with the absorption of the acid. Castor oil is not, therefore, as other laxatives, cumulative in its action, and from its brief stimulation of the intestines is to be regarded as a most innocuous purge.—*Pharmaceutical Journal and Transactions*, January 31, 1891.

CASES OF POISONING BY BROMOFORM.

Bromoform has been recommended by numerous observers in the strongest terms as a remedy in whooping-cough, but DR. NAUWELAERS (*Revue Mensuelle des Maladies de l'Enfance*, February, 1891) reports a case of poisoning in a child, aged 1 year and 3 months, suffering from whooping-cough, by 2 drops of a solution of 7 drachms to ¼ of bromoform, dissolved in an equal amount of alcohol, and given eight times daily.

The symptoms produced were profound stupor, paleness, coldness, complete muscular relaxation, tracheal râles, feebleness of respiration and circulation, contraction and immobility of the pupil, and insensibility of the cornea. The case proved fatal, and at the autopsy there was found slight congestion of the brain, marked injection of the stomach and duodenum, and great increase in bronchial secretions.

In the *Provincial Medical Journal* for February 2, 1891, is a second case reported by DR. E. SACHS, of a 4-year old child, in whom 3 drops of bromoform were ordered three times a day. In the absence of the mother, the child—doubtless tempted by the sweet taste of the mixture—got at the bottle, and drank what remained in it,—that is, about 15 minims of bromoform. Some time after, the child suddenly turned pale, and, staggering about, was put to bed. When seen by Dr. Sachs it was lying in a seemingly lifeless condition, with fixed dilated pupils, cyanotic lips, imperceptible pulse, and cold extremities. Injections of ether (Pravaz's syringefuls) and the application of a stream of cold water to the chest and back, soon brought the little patient back to consciousness, and the next day it had entirely recovered.

PROPHYLAXIS OF LEAD-POISONING.

M. LAVRAND states, in the *Journal des Sciences Médicales de Lille*, that he has found the administration of the iodide of iron pills of the French Codex, either alone or associated with phosphide of zinc, efficacious in arresting the progress of saturnism in workers in white lead. All the patients presented the earthy complexion characteristic of the initial stage of saturnism. The author found that under this treatment, even though the patients continued to ply their trade, the general health improved and the amount of hæmoglobin increased.—*National Druggist*, February 1, 1891.

CRADINA—A NEW DIGESTIVE FERMENT.

Ten years ago M. Bouchut found a powerful ferment in the juice of the common fig-tree (*Ficus carica*), and this is now the sub-

ject of a paper (*L'Orosi*, November, p. 364) by Dr. Mussi, who gives a description of the isolation of the substance, and named it *Cradina*, from *krade*, the name given by the Greeks to the part of the fig associated with digestive power. It is insoluble in water, but dissolves readily upon the addition of a trace of acid or alkali, and the solution, placed in contact with moist fibrin, effects complete and true digestion. It contains nitrogen, and in the dry state it forms a friable, semi-transparent, dark yellow, amorphous mass, yielding an amber-yellow powder. In water it swells, but does not dissolve, though upon being shaken it imparts to the liquid a milky appearance. When dissolved by the aid of alkali or acid a concentrated solution is dark yellow, but becomes colorless upon being diluted. Cradina differs from pepsin in maintaining its digestive power in an alkaline liquor, and from papain or papayotin in being insoluble in water, not precipitated from solution by alcohol or lead acetate, and in its activity not being diminished in the presence of hydrochloric acid. In a neutral liquid it is devoid of digestive power and it has no action upon starch.—*Quarterly Therapeutic Review*, January, 1891.

JAMBUL IN DIABETES MELLITUS.

Dr. Villy has devoted his inaugural thesis in Paris this year to a study of the therapeutic value of jambul (*Eugenia jambolana Lamark; Syzygium jambolanum de Candolle*), his studies being made under the direction of Professor Dujardin-Beaumetz, and his results being published in the *Bulletin Général de Thérapeutique* for January 30, 1891. Numerous observations have already been published as to the value of this substance in the treatment of diabetes, but the results have been so contradictory that there must evidently have been some source of error upon the part of one or more of the writers on this subject. Nearly all authors who have studied the question agree in attributing to the seeds alone the mechanism of active properties, while other parts of the plant are either uncertain or without any value whatever. An examination of the literature of this subject also shows the striking difference between the quantities of this substance recommended as a dose by different authors. Some claim that it is only necessary to give fourteen grains to see the diabetes entirely disappear, while others claim to have administered more than seven hundred and fifty grains in twenty-four hours. The remedy does not appear to be entirely without unfavorable after-effects, since cases are on record where its use produced such severe depression as to necessitate its suspension. Nevertheless, the substance cannot be regarded as an active poison, for it is stated that rabbits have received in twenty-four hours their own weight of the powdered jambul seeds without apparently suffering the least disturbance of any kind. In an attempt to explain the asserted action of this substance, one view evidently would suggest itself that it would prevent the formation of sugar from lower carbohydrates, and the statement has been made that the addition of jambul to a mixture of starch and meal, which would naturally give forty-four per cent. of its weight of sugar on the addition of the jambul, only produced nineteen per cent. of sugar. Dr. Villy undertook to investigate the question from this point of view, and, by a number of careful experiments, which he reports in detail, seems to have shown the exact opposite effect is obtained, for he maintains that the jambul, instead of delaying or preventing fermentation of carbohydrates, accelerates it in the most indisputable manner. Dr. Villy takes exception to the deduction of any conclusions of therapeutic value from the experiments reported in previous numbers of the Gazette by Graser and Von Mehring, in which jambul succeeded in removing the diabetes mellitus produced by phlorizine, the suggestion being made that a more rational method of testing this would be to produce experimental diabetes through the extirpation of the pancreas, and to then test the action of jambul on the digestion of amylaceous matters. This experiment, however, has not yet been performed, and the author reports three cases of diabetes mellitus occurring in the service of Dujardin-Beaumetz, in the course of which jambul was administered, and from the observations made on these cases the author comes to the following conclusions:

In the first place, the author states that his observations on jambul do not justify the enthusiasm which has hitherto attended its use, and from his point of view the applicability of this vegetable substance is extremely limited. Above all, he lays stress upon the importance of excluding jambul from the treatment of diabetes if the normal regimen is continued, or in such cases the polyuria persists and the glycosuria and albuminuria augment instead of diminishing.

On the other hand, in cases of moderate severity, with or without albuminuria, jambul may apparently prove of some service, provided the regimen be absolutely restricted; and th—

can be no doubt that the restriction of diet is the more important measure of treatment, while jambul, like other remedies, is simply accessory to it. Jambul is well supported by the stomach, and may be given in doses of 150 to 200 grains, in divided doses, in twenty-four hours. In cases of severe diabetes, where diet alone will produce any effect, jambul is likewise inefficacious.

AN EARLY ATAXIC SIGN.

WEISS, of Vienna, says that an early symptom of locomotor ataxia is an inability on the part of the patient to walk backward, while as yet, and in other ways, he may be able to walk with firmness and rapidity. PERRON, of Bordeaux, has also, as we stated several weeks ago, recently suggested an early diagnostic sign, which is simply a modification of the Romberg test,—namely, causing the suspected ataxic patient to stand upon one leg, instead of two, with the eyes closed. If the patient shows a tendency to fall, it may be inferred that the spinal trouble has begun which will lead on to locomotor ataxia, even if the Romberg test fails, as it not infrequently does in cases that are not well advanced.—*New York Medical Journal*, January 24, 1891.

THE GALACTOGOGUE PROPERTIES OF GALEGA.

At the meeting of the Société de Médecin Pratique, held January 15, 1891, DR. DE LA CARRIÈRE read a paper, in which he claimed that galega exerted marked influence as a galactogogue in cases where the secretion of milk was diminished (*Le Progrès Médical*, January 24, 1891).

Galega was given in a watery extract, in the dose of from 32 to 64 grains each day, and in almost all cases produced marked augmentation in the secretion of milk within a few days. It is stated that the secretion is not only increased in volume, but that also the solids in the milk are likewise augmented.

RETINOL AS A SOLVENT.

At the meeting of the Société de Médecin Pratique, held January 15, 1891, DR. VIGIER presented a number of preparations in which phosphorus, salol, and creosote were dissolved in retinol (*Le Progrès Médical*, January 24, 1891). He laid great stress on the value of retinol as a solvent for phosphorus. Being unoxidizable, it is admirably suited as a vehicle for the solution of phosphorus, and such a solution remains unchanged indefinitely. So, also, a fragment of phosphorus, if ignited and then plunged into retinol, is instantly extinguished. These preparations of retinol may be used in scrofula, anæmia, chlorosis, muscular paralysis, locomotor ataxia, and, in fact, in any condition in which phosphorus is indicated.

Dr. Vigier also mentions the fact that retinol readily dissolves naphthol, aristol, iodol, codeine, camphor, cocaine, and strychnine.

CHLOROSIS AND ITS TREATMENT.

DR. FREDERICK SCHOLZ, of Bremen, has published a remarkable work on chlorosis, the outcome of observations made during the last twenty years. Instead of regarding the deficiency of iron or hæmoglobin, or even that of the red corpuscles, as the primary affection, he states that contraction of the vessels is always present in these cases, as indeed was observed by Bamberger, Rokitansky, and Virchow; and this, he contends, is not to be regarded as a complication due to an altered condition of the blood, but as the primary condition which is followed by the morbid change in the blood. As a matter of fact, the vessels are, he says, too full, or in the condition termed by the older physicians "plethora ad vasa," the blood being—or becoming—abnormally serous. Long ago his attention was struck by the cold and livid condition of the skin in anæmic subjects, and he was led by this to employ hot baths, together with gentle friction, in the treatment, with the view of acting directly upon the skin, so as to improve the vitality and nutrition generally. The success of his first attempts was so marked that he was encouraged to persevere in this line of treatment, and he has since had many opportunities of extending his experience with it. Hot baths diminish the plethora by relaxing the tension of the vascular system, which is high, quickening the circulation, and thus relieving the palpitation, dyspnœa, and other symptoms. In thirty cases where the distress of the patient was very great, Dr. Scholz has gone a step further and supplemented the hot bath by venesection. Paradoxical as this treatment may appear, it was followed by marked benefit, and if the theory of the pathology of chlorosis above mentioned be correct, there can be little doubt that the novel line of treatment practised by Dr. Scholz is justifiable.—*Lancet*, January 24, 1891.

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ON THE VALUE OF THE INHALATION OF CHLORINE GAS AND THE USE OF IODINE AND CHLORIDE OF GOLD AND SODIUM HYPODERMICALLY IN THE TREATMENT OF PULMONARY CONSUMPTION,

WITH AN ABSTRACT OF THE CLINICAL HISTORY OF TWENTY-SEVEN CASES.

BY HENEAGE GIBBES, M.D.*, AND E. L. SHURLY, M.D.†

IN answer to many requests, suggestions, and inquiries, we herewith publish notes of further observation upon the treatment of phthisis pulmonalis with iodine and gold and sodium chloride hypodermically and chlorine gas locally, together with some case histories illustrating the same. While our experience is yet too limited to determine accurately its real value compared to other plans of treatment, still its use, more or less, for about eight months on human beings has given us some data which may prove interesting.

First, have we a theory? Yes. We have a theory founded on facts that general tuberculosis and phthisis pulmonalis, as diseases, are entities differing considerably,—the one a general disease in which the anatomical lesions may be found in all the organs of the body; the other, with anatomical lesions principally and primarily in the respiratory apparatus; the final course of the former (tuberculosis) depending upon a destructive taking the place of the constructive metabolism, and concerning the bichemical actions belonging to either protoplasm, nuclein, or chloromin, or all combined, and depending upon either hereditary or acquired tendency to elemental perversions of nutrition: these resulting in the formation of chemical poisons known as toxalbumos

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To the query as to what is meant by inherited tendency may be mentioned syphilis and acquired exhaustion from mental overwork, worry, pernicious habits of life, bad surroundings, etc. Regarding the bacillus tuberculosis as a factor, we do not deny its universal existence in nature and the possibility of its spores entering the interfascicular lymphatic spaces through the pseudo-stomata in the air-cells, thence into the lymph-current to the bronchial glands, but believe that these spores, having thus passed into the tissues, cannot germinate unless they find a suitable pabulum, which in the case of the tubercle bacilli we believe to be caseous matter; and we consider this to be proved by the fact that in inoculated animals we do not find tubercle bacilli in the lesions until caseation has taken place; it would, therefore, seem that some substance associated with them constitutes the real virus.

Phthisis pulmonalis we believe to be a disease located in the pulmonary organs, and in each instance an inflammatory process of greater or lesser degree or extent resulting in permanent or destructive changes of the tissues, which are likewise accompanied by the production of deleterious chemical substances which set up constitutional disturbances and exhaust the vital forces. The particular form of degeneration known as caseation is probably peculiar to the lungs, lymphatic tissues, etc., although in the present state of our knowledge it cannot be differentiated from apparently similar processes in other organs. Hence, with such ideas, we have been working for the last few years to find something which would combine with and neutralize these tox-albumoses, or whatever they may be, and arrest the disease process. To this end we have labored, with the result that we find that chlorine gas, iodine, ammonium iodide, potassium iodide, the double salt of chloride of gold and sodium, liquor potassæ, potassium permanganate, iron arseniate, the mercurial salts, etc., will do good service. Chlorine gas, iodine, and the double salt of gold and sodium chloride, however, are by far the most efficacious. In the first place, these substances must be chemically pure, and the solution must contain glycerin. We have been trying solutions made with ether, lanolin, oleic acid, fixed oils, etc., especially with iodine, but whether we can obtain such good results as with the glycerin is a question yet to be determined.*

* Dr. Clark has been indefatigable in this work, having made solutions with almost every solvent known to chemists, the interesting results of his labor in this line will be published soon.

CHLORINE GAS.

There are two modes of administering chlorine. First, the gas may be evolved from chlorinated lime (which is nearly one-half chlorine) by the addition of dilute hydrochloric acid. In a small room or compartment of about five hundred and fifty cubic feet place from one-half drachm to six drachms of chlorinated lime spread out in a saucer or shallow glass dish, and to this add slowly from one to three drachms of dilute hydrochloric acid, stirring with a wooden spoon or spatula. There are few cases requiring as much as the six drachms. One-half drachm is the commencing amount, and more should be used each day until about three to four drachms is reached. Before the gas is evolved the atmosphere should be well charged with a spray of a saturated solution of sodium chloride. It will take about two ounces of the solution to do this, but more will be required if the room is not comparatively air-tight. The spray should be continued during the evolution of the gas; in fact, during most of the time the patient is there. The patient should be directed to keep the mouth closed and breathe through the nose. It seems in a majority of cases that mouth-breathing during the inhalation leads to coughing. The first sitting may be about two minutes, while the subsequent ones may be increased to twenty or thirty minutes. One or at most two sittings are sufficient, although some cases will require three or four daily.

The other method for inhalation of chlorine, and one which is preferable for mild cases and for laryngeal phthisis, is the inhalation of chlorine water. The chlorine water should be made according to the U. S. Pharmacopœia, and may be mixed with a saturated solution of salt in the proportion of one-half, one-third, or one-fourth, and from one-half to two ounces of the mixed solution may be vaporized at a sitting. Should much irritation follow an inhalation for any considerable time, less must be used.

Cases of laryngeal phthisis where there is not much "breaking down" ought to be treated with the weaker solution, while those showing considerable ulceration will need frequent sittings and stronger solutions. A face inhaler, such as is used in Harper Hospital,† offers the best mode of administration.

Chlorine inhalations seem to be very efficient in preventing further caseation, as shown by changes in the sputum and the alteration of some of the physical signs under its use. A

† The Harper Hospital Inhaler can be procured of Milburn, Woodward Avenue, Detroit.

varying tolerance to it will be observed from time to time, probably owing to the quantity of secretion present in the bronchial tubes at time of inhalation. Usually it is better for the patient to inhale soon after a thorough expectoration and not too near meal-times, as not unfrequently there is a striking effect upon the stomach, as shown by nausea or vomiting, which may be brought about through the nerve-centres. The gas is practically irrespirable unless diffused in vapor of chloride of sodium. This was probably the reason for its abandonment by Gannel, who gave it by inhalation in 1828.

Hypodermic Injections.—On account of the changes which chemicals undergo in the stomach and intestines before diffusion throughout the system, it is almost impossible to obtain certain effects, especially upon those morbid products known as toxalbumoses. It is, therefore, necessary to avail ourselves of some other way for introducing medicaments into the body, and perhaps there is no better way than by the hypodermic method. The instrument should be provided with either gold- or platinum plated needles. Any hypodermic syringe which can be kept clean and aseptic will answer the purpose. Owing to the action of both iodine and gold on the packing and needle, it is difficult to keep the instrument in order without great attention. Immediately after its use it should be cleansed with warm water, and then with alcohol, after which it should be charged with a five per cent. solution of carbolic acid, which may remain in the barrel for at least ten minutes. Just before using again, it should be cleansed with warm water. Whenever the needle becomes rough or dull, it should be thrown away. Regarding the place for insertion, we have found the gluteal region preferable, because there is less pain, danger of abscess, or ulceration of the skin. Probably other regions may offer as favorable a site in some individuals. The iodine solution gives considerable pain to some people, to others very little, but the gold solution gives little or none. We hope that a solution can be made with lanolin, or something of that sort, which will obviate this objection in the case of iodine. With a majority of patients we find it better to begin with the iodine $\frac{1}{12}$ grain daily, gradually increasing until reaching $\frac{1}{4}$ grain, and in some instances 1 grain; then the gold and sodium solution may be injected daily, beginning with $\frac{1}{60}$ or $\frac{1}{30}$ grain, and gradually increasing until reaching $\frac{1}{6}$, or even $\frac{1}{4}$ grain at this point, the quantity should be diminished to $\frac{1}{10}$ grain daily if the medication is to be continued. At this stage it will be found often better to alternate them, one day using iodine and the next gold. If albumen appears in the urine, the iodine must be suspended, and the gold alone used. The continuance of large doses of the gold and sodium salt may produce a golden color of the skin, which can possibly be attributed to bile. During the administration of iodine in this way, the patient usually loses weight, and if, having had previously a tendency to catarrh of the bladder or intestines, this condition may be again set up.

The temperature also usually increases for a week or ten days, and may be accompanied by excessive sweating. The expectoration soon becomes lessened, and watery later on. Asthmatic symptoms and anorexia may in some instances supervene, the tongue becoming heavily coated, and, when the point of saturation is reached, diarrhœa comes on, the throat is dry, and the patient listless. The pulse may be quickened, but does not seem to loosen its tension. These symptoms occur only in a small percentage of the cases. The injection of gold and sodium in these cases is followed by a tonic reaction, these symptoms gradually disappearing, excepting perhaps the anorexia. In large doses of the gold and sodium, vertigo and nausea may appear occasionally. Our experience would show that the majority of patients do better on smaller than on large doses. One feature which seems to be quite constant in cases showing rapid improvement is the supervention of asthmatic symptoms, such as sibilant râles, which may be due to the astringent action of the gold. There has been little or no tendency to hæmoptysis, although blood-streaked mucus is sometimes observed under large doses of iodine. In three cases enlarged lymphatic glands rapidly disappeared. After two or three weeks, as a rule, these chemicals ought to be used alternately every day or every other day; finally once or twice a week. Iodine cannot be used alone for any great length of time, but the gold and sodium salt can; therefore, by using them alternately, the effect of the iodine may be prolonged.

The following cases have been taken at random from the clinical records of Harper Hospital:

CASE I.—Wm. C., aged 22; native of Detroit; single; occupation, clerk in railroad office; good habits.

Family History.—A number of father's family have suffered with phthisis. One older brother of patient has phthisis. Has generally been well until January, 1890, when he "took

cold," and has coughed since with increasing expectoration and has been losing weight; has had no hæmoptysis, but has expectorated bloody mucus; chills and fever irregular; some night-sweating; no diarrhœa, but indigestion; not hoarse; no sore throat; no nasal catarrh or stenosis; was not with brother much; never been a milk-drinker to any extent.

August 12, 1890.—Very pale and thin; height, five feet ten and a half inches; weight, one hundred and twenty-three pounds; fingers slightly clubbed; nostrils dilated; able to be up part of the day and go out; respiration 32, pulse 96, temperature 101°; considerable cough and expectoration at night and early morning; tubercle bacilli in sputum; no appetite.

Physical Signs.—Dulness on percussion over upper left front and back; bronchial respiration; bronchophony and thick moist râles over same region; upper right front and back, coarse respiration.

Treatment.—Hypodermic injection of iodine, $\frac{1}{12}$ grain daily; also inhalation of chlorine water and solution of sodium chloride, equal parts daily; also 3 grains each of bone-meal and ferri carbonate three times a day, and a teaspoonful of a syrup of rum, molasses, and paregoric during evening and night to allay cough.

During first week temperature remained higher, 101° during the afternoon, and 103° in the evening and at times in the middle of the day. Complained of weakness and cough, although expectoration was easier. The latter part of August, however, the temperature had fallen to 99.5° and 101°. There were no night-sweats, but considerable diarrhœa and nausea, and soreness of throat. The expectoration had diminished considerably in character, but still contained tubercle bacilli. The dose of iodine, however, had been increased until he was getting ½ grain. At this time hypodermic injections of gold and sodium were substituted for the iodine, beginning with $\frac{1}{20}$ grain. This was continued daily, increasing the dose every second day until $\frac{1}{8}$ grain was reached, which produced nausea and dilatation of the pupils. It was now dropped to $\frac{1}{10}$ grain daily until September 14, when the injections of iodine and gold were used alternately every other day,—⅓ grain iodine and $\frac{1}{10}$ grain gold and sodium. During October, November, December, January, and February he was subjected to about two to three injections a week, with three inhalations, and during March he has had one injection of gold and sodium, $\frac{1}{8}$ grain, every week, with three inhalations. He has had no medicine *per orem* excepting on a few occasions a cathartic. Since September 10 has walked out nearly every day. Has had no abnormal temperature since early in November. Has very little cough in the morning, and not more than two drachms of expectoration in twenty-four hours, except after being out on a windy day and after inhalation. There are no tubercle bacilli in the expectoration; appetite is good, bowels are regular, digestion is good, and he sleeps well. Physical signs show slight dulness over upper left front and coarse respiration with abnormal transmission of heart-sounds and creaking on forced inspiration. He has also nearly regained his normal weight.

CASE II.—E. J., clerk; good hygienic surroundings; single; native of Michigan; lost one brother of phthisis, otherwise family history good. He was generally well until he took cold at a parade in September, 1889, and was sick in bed for three weeks with, he says, pneumonia; since this he has continued to cough, at first without much expectoration, but latterly increasing.

He had been having more or less pain in his chest, especially the left side, and notices an increase of breathlessness upon exertion, and he has never recovered strength or weight since his last illness. His appetite has been fair most of the time, however, and no diarrhœa or dyspepsia appeared.

His principal complaints are a harassing cough, pain in the chest, and debility, and also nocturnal sweating occasionally.

At the time he was seen he had elevated temperature, rapid pulse, rapid respiration, and was pale and emaciated.

Physical examination of the chest showed dulness on percussion over the whole left side, bronchial respiration, bronchophony over upper right front and back, with a small cavity in the lower portion of the left infraclavicular region showing cavernous respiration with gurgling râles, and tubercle bacilli in his sputum. Right side appeared emphysematous, and the percussion resonance high pitched over the right back, with moist crackling in the right and left interscapular region.

He was sent to Harper Hospital February 18, and treated with inhalations of chlorine gas and the internal administration of Lugol's solution of iodine, extract of malt and whiskey alternated with the salicine and malt mixture, with occasional doses of quinine.

The chlorine gas was administered alone with air and with the sprays of bicarbonate of sodium, bicarbonate of ammonium, petrolina and olive oil, and carbonate of magnesia, but

without much effect, as he was unable to bear this until the latter part of his stay, when it was administered with the spray of chloride of sodium, and from March 5 to 25 he received two inhalations daily, and was also put in the cabinet daily during the last week in the hospital.

He continued to improve, and physical examination on March 24 showed the left lung clear, the respiratory murmur returned, the gurgling râles at the seat of the breaking down had disappeared, leaving a soft, low-pitched, cavernous respiration at that spot, and there still remained a high-pitched resonance on the right side, with a prolonged murmur; much better evening temperature, during the last ten days reaching only 95.5° in the evening; expectoration greatly diminished, but still a good deal of cough, but no nocturnal sweating. Left hospital March 25, and on April 25 went to Colorado and remained until the following August. He presented himself for examination on August 8, apparently very much improved. The physical signs previously noted had disappeared, but broncho-vesicular respiration still remained over the left lung; bronchophony and abnormal heart-sounds were heard in the infraclavicular region. He still had considerable cough night and morning, but had gained flesh and strength, and his appetite was good, also his digestion, and he had no elevation of temperature.

On August 28 he presented himself with increased cough, temperature of 99.5°, and stated that his appetite was diminished and he was restless at night. I ordered a tablespoonful of Parke, Davis & Co.'s emulsion of oil of eulicum three times a day after meals; also hypodermic injections of 1/6 grain of iodine and solution of potassium iodide, which he received every day for ten days, after which signs of abscess appeared at the seat of injection, and this was discontinued.

He also had during this time inhalation of chlorine water, with a solution of chloride of sodium daily. Temperature increased so that he rarely had when examined a temperature less than 100°, which was probably due to the abscess.

Physical signs showed mucous râles over the whole upper front, with mucous crackling. The abscess was discharging, but finally healed, and the hypodermic injections of chloride of gold and sodium were used instead of iodine on September 18, and were continued until October 2, when, another abscess threatening, this also was stopped; but at this time we succeeded in obtaining from Dr. Clark pure chemicals, and no further trouble arose from abscesses, and he has now been much better. Temperature 98.5° to 99.5°; cough and expectoration very much lessened; strength returning; and from November 6 to February 1, 1891, he has had two injections weekly, and from one to two inhalations of chlorine; during February he has had but one injection of iodine. He seems perfectly well, seldom coughs, and has no expectoration. Expectoration of September 5 contained a few tubercle bacilli, but on examining what little we can collect now, none can be found. He is taking no medicine, is apparently well, and has resumed his occupation.

We have recommended him, however, to reside in New Mexico or Colorado for two or three years.

CASE III.—Miss J. C., native of Detroit; school-teacher; lives in good hygienic surroundings, with plenty of good food; not much of a milk-drinker; never very fleshy, nor very strong.

Family History.—She lost two maternal aunts and one sister of phthisis; was not with her aunts or much with her sister during their illness; was subject to taking cold, but in tolerable condition until about November, 1889, when she "took cold," and continued coughing, having occasionally chills, fever, and night-sweating, and in latter part of December had a hæmoptysis (probably two ounces). From this time she continued to feel badly, although not expectorating much; continued attending her school irregularly. On January 1, 1890, she was in the following condition: Pulse 96; frequent cough and little expectoration; temperature 100°, respiration 26; skin dry; tongue coated; no diarrhœa, but poor appetite; says she is easily tired, and has pain in left chest and shortness of breath upon exertion; menstruation scanty.

Physical Signs.—Slight dulness on percussion over upper left front; bronchial respiration diminished, fremitus, and exaggerated vocal resonance, with dry crackling on forced respiration over same region extending down to third rib.

Treatment consisted of counter-irritation, rest, and the administration of quinine and iodoform with creosote, and thymol inhalation. She gradually grew better, and in the middle of February resumed her school duties, which she continued for part of each day. March 1 she felt better, still coughing and having a temperature of 99.5° to 100° at night; appetite better; forced herself to eat because very anxious. During April she did very well, but in early

part of May grew worse; had slight hæmoptysis. Temperature ranged daily from 98° to 101°; more pain in chest, and more cough and expectoration; night-sweats appeared and diarrhœa for a few days. She was treated with quinine and salicin, and rest enjoined; she now resigned her position in the school.

Physical exploration of the chest showed mucous râles over upper left front; expectoration showed bacilli. During May she continued very ill, although up and about a little every day. During this time she had inhalations of bichloride of mercury, creolin, creosote, and resorcin, anodynes to allay cough, and syrup of the iodide of iron, with nutritious food. May 28 to 31 she was worse, having high temperature (at night 104°), anorexia, diarrhœa, and more cough and expectoration. She grew better in a few days, and left the city with friends, about June 15, for the upper part of the State. She remained away until the middle of August, when she returned somewhat weaker, with more cough and expectoration again, and higher temperature; her appetite, however, was better, digestion good, and bowels in good condition. She had taken while away bone-meal and extract of malt, with some whiskey once or twice daily, with nutritious diet. She remained in about the same condition until September 10, when the temperature increased, as also the cough, pain in the chest, and expectoration. She was growing weaker, although yet able to be up the greater part of the day; was very much emaciated and having night-sweats again; hoarse and having sore throat; sputum contained tubercle bacilli.

Physical signs showed mucous râles and moist crackling over upper left and cavernous respiration with creaking at left apex; bronchophony, also broncho-vesicular respiration and coarse râles over upper right front and over left back. Laryngeal examination showed redness and swelling of the upper larynx, with uniform swelling of arytenoids, ary-epiglotic folds, and ventricular bands, but epiglottis not swollen; no erosion could be seen anywhere. She was now given hypodermic injections of $\frac{1}{12}$ grain iodine daily, and an inhalation of chlorine water and solution of chloride of sodium. The iodine was increased ½ grain the third week, when the gold and sodium was substituted, owing to increased mucous expectoration, diarrhœa, and skin eruptions coming on. After the fourth week she received injections (and a few times the solutions mixed) every other day, every second, third, fourth, fifth, and sixth day, and so on; she now receives one injection every two weeks.

The inhalation of chlorine water was kept up until February 5, since which time she has had none. Occasionally, for a complaint of faucial rawness, she received an inhalation of creolin from a face-shield inhaler. She was treated mostly with the iodine solution, ranging from $\frac{1}{12}$ to ⅓ grain.

October 18.—She seemed worse, and so continued for about a week, having an exacerbation of fever and chills, with increased cough and expectoration. She had also a remission of high temperature, etc., from November 3 to 6, and again from January 2 to 8, but otherwise has gradually improved in every way until now. Since February 15 the temperature (taken irregularly) has shown no elevation; pulse 80 to 84; appetite and digestion good. She resumed her duties as teacher after the holiday vacation, and has lost no time since. She has taken little or no medicine per orem since early in January, and the physical signs clearly show retrogression of the process. Her voice is slightly husky, but larynx examined shows only a thickening of the ventricular bands. There is no odynphagia.

CASE IV.—A. P., aged 25; American; married; height, six feet; normal weight, one hundred and seventy-five pounds; present weight, one hundred and twenty-five pounds; farmer three years, formerly cooper; habits good.

Family History.—Good, excepting paternal grandfather died of phthisis. Previous history: Was well until about four years ago, at which time he underwent great exposure, taking cold; says he had pneumonia. Has since that time occasionally expectorated clear blood; has coughed ever since more or less during the winter; for the last year has had fever occasionally; continual discharge from right ear, but not much expectoration until within the last six months, since which time he has been gradually losing flesh and strength. Last three months expectoration has been very considerable. He also had chills and fever, with occasional diarrhœa. Appetite has been capricious. Has not been exposed to phthisical patients.

October 27, 1890.—Pale, very thin; pulse 110, temperature 100°, respiration 28; appetite poor, tongue coated, bowels regular.

Physical Signs.—Percussion dull over upper left front and back; bronchial respiration; bronchophony; moist crackling over small area. Over the left mammary region and over the upper right front, broncho-vesicular respi-

ration; no râles. Examination of sputum shows pus and tubercle bacilli; laryngoscopical examination shows hyperæmia of the upper larynx, with only slight swelling; slight hoarseness at night.

Treatment.—Hypodermic injections of gold and sodium chloride $\frac{1}{80}$ grain every evening; inhalation of napthalin in the inhaling-room twice daily; mixture of salicin, extract of malt, spiritus frumenti, given internally, three times daily at meal-times.

Temperature ranged, up to November 23, from 97° to 98° in the morning to 101° to 102° in the evening; from the 23d to the 30th it greatly diminished, ranging from 98.5° to 99° and 99.5°; from that time to the time of leaving the hospital (December 5), temperature ranged, with the exception of one evening (on the 3d), from 98.5° to 99°. Respiration at this time, from November 28 to December 5, was between 20 and 24; pulse from 76 to 90. Expectoration diminished to about one ounce in twenty-four hours, mostly in the morning. Hypodermic injections were increased from $\frac{1}{80}$ grain to $\frac{1}{8}$ grain. Temperature, taken half an hour after injection of $\frac{1}{8}$ grain, shows increase of temperature of one degree, which did not remain, however, more than half an hour longer. On November 23 one hypodermic injection of bisulphate of quinine (6 grains), was given on account of persistent feeling of chilliness. On November 21 he received a hypodermic injection of iodine, $\frac{1}{12}$ grain, increased on the 23d to $\frac{1}{6}$ grain, which was continued until December 21, when an injection of gold and sodium chloride, $\frac{1}{10}$ grain, was given each day during the remainder of his stay in the hospital. From November 20 to 24 he complained of a soreness of the throat; laryngoscopic examination showed increased congestion. The inhalations of napthalin were continued until the 19th, when chlorine gas with spray of solution of chloride of sodium were substituted and continued daily until his departure. Examination of urine during treatment showed nothing abnormal excepting the quantity of earthy phosphates. There was no trouble at the site of the injections in the gluteal regions.

December 2.—There were no tubercle bacilli in the sputum.

December 5.—Physical exploration of the chest showed no râles, but still coarse respiration at the upper left front. Injections of gold and chloride were continued at his home during December and January, at which time (the latter part of January) he was reported as having little or no cough, with gain in body-weight, and feeling perfectly well.

CASE V.—T. C. P., aged 33; American; married; resides in city (cottage); habits good,—smokes and chews moderately; occupation, clerk in store.

Family history good. He has been generally well until a few months ago, when he began to cough and expectorated a little in the morning; about six weeks ago this became worse, together with a feeling of heat and restlessness; for the past three weeks has been feeling much worse and obliged to give up work; poor appetite; bowels constipated; feeling of chilliness several times daily, followed with sensation of heat; slight sweats at night towards morning; pulse 108, respiration 28; tongue coated; feeling of nausea; incessant cough; expectorations small in quantity, thick, and offensive; no tubercle bacilli present; pain in the chest.

Physical Signs.—Dulness on percussion; bronchial respiration and abnormal transmission of heart-sounds over the upper left front down to the third rib; no râles; prolonged and jerky respiration.

Treatment.—Hypodermic injections of iodine, beginning with $\frac{1}{12}$ grain, increased every second day until $\frac{1}{4}$ grain was reached. Inhalations of eucalyptol twice daily in the inhaling-room. Internally, salicin, malt, whiskey mixture, a tablespoonful three times a day; $\frac{1}{4}$ grain codeine in syrup of tolu to allay coughing at night. From November 23 one inhalation of chlorine gas was given daily, and was continued for about ten days on account of irritability of the pharnyx. From November 24 the temperature ranged from 97° in the morning to 100° and 101° at night. From the 24th to the 27th the evening temperature did not rise above 99°. The morning temperature on two occasions was 97° On the 28th, after an injection of iodine, $\frac{1}{8}$ grain, the temperature at 10 P.M. reached 102°. Also on the 29th, after an injection of $\frac{1}{8}$ grain, it reached 102.1°, and during that night copious perspiration and incessant cough; very free mucous expectoration during these two days and nights, with watery discharge from the nose. The following day physical exploration showed mucous râles all over both sides of the chest. The hypodermic dose used was decreased to $\frac{1}{8}$ grain, and he continued to receive $\frac{1}{8}$ at each injection from this on, with subsidence of these symptoms. Temperature range gradually changed until, from December 2 to 13, the evening temperature ran from 99° to 99.5°;

morning temperature, from 97.5° to 98.5°. The pulse range, from November 29 to December 13, was from 70 to 86. Respiration greatly lowered and remained from 20 to 22 from November 30 to December 13, when he left. Examination of sputum on November 21 showed numerous tubercle bacilli; fewer on December 2, and on December 18, five days after leaving the hospital, examination of the sputum showed no bacilli present.

Physical Signs.—On the 1st of December, no appreciable dulness on percussion; broncho-vesicular but smooth respiration; a few distant creaking râles towards the sternum. Physical exploration of chest, December 13, same as above, with the exception of no râles being present. The cough continued at night until about the 1st of February, but with little or no expectoration. He continued to receive iodine injections of ⅛ grain twice a week up to February 2, since which time he has had no treatment; he appears perfectly well, with no cough, and attending to his duties every day.

CASE VI.—A. McL., aged 22; Canadian; single; hygienic surroundings good; habits good; school-teacher.

Family history good. Father died of pneumonia at 57 years of age. She has always been well until attacked with "la grippe" last winter, when she was ill in bed three days with high fever, headache, etc.; never had hæmoptysis. Since then she has had continuous cough, with thick, yellowish expectoration and a growing hoarseness of the voice, with more or less pain in swallowing. Improved for a while during the summer, when she was in Ottawa, Canada. Menstruation irregular, and has been growing more so, and scanty. Bowels also irregular for last two months. Chills and fever occasionally, with nocturnal sweating at times. Emaciation has been slow, although sensation of weakness has been progressive.

November 14.—Almost aphonic, breathing rather stridulous; cough short, brassy, and incessant; expectoration thick and yellow, about eight ounces in twenty-four hours; cough also very troublesome at night; some nasal stenosis; temperature 102.2° (8 P.M.), pulse 110, respiration 34; tongue coated; appetite tolerably good, but had difficulty in swallowing food.

Physical Signs.—Examination of sputum showed a few tubercle bacilli; laryngoscopic examination showed swelling of the arytenoids and ventricles, with slight erosion of these, and in other places granular projections; also erosion of the right vocal cord. The glandular tissues of the ventricles seemed to be tumefied. The physical signs showed slight dulness at the upper right lung front and back, bronchial respiration, prolonged expirations, bronchophony; crackling mucous râles in the left infraclavicular region towards the sternum; small area of cavernous respiration and gurgling râles, bronchophony extending to the fourth rib; dulness on percussion over left side behind; no bronchophony.

Treatment consisted in the administration of hypodermic injection of iodine ⅙ grain, immediately preceded by a four per cent. solution of cocaine every day; inhalation of chlorine water with solution of chloride of sodium with face-shield inhaler (1 ounce of the mixture being used at each sitting, which was given four times daily); 5 grains of acetanilide with 4 minims of fluid extract of gelsemium at night; the administration of 15 minims of syrup of iodide of iron in teaspoonful of compound syrup of hypophosphites three times a day.

Temperature ranged, from this time to November 27, at 101.5° to 102.5° up to the 26th, and the pulse from 98 to 115. Respiration from 32 to 26 to the 21st of November, and from the 21st to the 27th from 19 to 26. From the 26th the temperature steadily declined until the 8th of December, when it rose to 102.5° at 8 P.M., and was 97.5° the following morning.

From November 22 to the 26th insufflation of iodoform were used daily in addition to the other inhalation. The syrup of iodide of iron and hypophosphites were discontinued after November 20, and 5 grains of bone-meal in extract of malt three times daily was given instead.

The laryngeal symptoms gradually declined in severity, and a diminution of swelling and a repair of the eroded spots could be observed with the laryngoscope very easily. The voice began to change for the better about December 1, and continued, although hoarse, to grow in strength. The respiration became easier, so that she could exercise without any difficulty. Coughing grew less, especially at night, from the 30th until the time of her leaving the hospital. Physical signs also improved, so that on December 14 the only râles present were occasional cracklings over the upper right front. The respiration, however, continued to be coarse, and the examination of the sputum on December 3 proved negative. She had occasionally during that time inhalations at night of spirits of chloroform and ether to

allay cough, and applications of oleum terebinth; acetanilide and gelsemium were discontinued on the 21st. After that she had salt baths every second night. The evening temperature continued from 99° to 99.5° up to the time she left the hospital on the 24th of December. Expectoration was at this time very much diminished, and she had regained her strength. On November 29 she complained of watery discharge from the nose, soreness of the eyes, and dryness of the throat, with some diarrhœa, which was supposed to be due to the iodine, and chloride of gold and sodium was substituted after that and used until December 11 in doses of $\frac{1}{10}$ to $\frac{1}{5}$ grain, when copious perspiration, supposed to be due to the gold and sodium salts, led to its discontinuance and substitution of the iodine, $\frac{1}{16}$ grain, which was used continuously until she left the hospital. This hypodermic medication was continued at her home for a few weeks, and at the last report from her, the early part of this month, she was perfectly well and had resumed her duties, but was still hoarse, and had now no abnormal temperature at night.

Case VII.—Grace, M. C., aged 16; height, five feet four inches; weight, one hundred and twenty-eight pounds; native of Michigan; resides in a village; good hygienic surroundings; attended school until the 1st of January, 1890.

Family history of parents good. Patient has one sister and one brother younger, and one brother older, living. Lost one sister, aged 20, of pneumonia (?). Lived in the house with this sister, but was not near her much. She has been well until last July, at the time of the death of her sister, when she began to cough, having chills, fever, etc. Had hæmoptysis. Grew better from this attack, and had become nearly well until three weeks ago, when she took cold and has been quite ill since; has chills, fever, coughing, nocturnal sweating, etc.

November 12.—Anæmic appearance; thin; pulse 120, small; temperature 100.4°, respiration 30; skin clammy; considerable cough and much expectoration of grayish tenacious sputum; bowels regular, poor appetite, no dyspepsia; sleeps well, excepting for cough; menstruation regular, but scanty; no extra discharge from the nose or stenosis.

Physical Signs.—Laryngoscopic examination shows hyperæmia of the larynx and increased mucous secretion; not much swelling; voice good; chest movements rhythmical; percussion dull over lower right back.

Auscultation. — Paddle-wheel respiration, both upper fronts increased fremitus; exaggerated resonance over right lung; loss of respiratory murmur over right back; diastolic cardiac murmur near sternum and the second costal cartilage. Examination of the sputum showed tubercle bacilli; amount of expectoration has been about six ounces daily.

Treatment.—Chlorine inhalation in inhaling-room twice daily. Five grains of bone-meal in malt extract three times daily before eating; hypodermic injection of iodine, $\frac{1}{12}$ grain, daily. Temperature ranged from 99° to 101° up to the 29th, and the pulse from 100 to 120, excepting on the morning of the 26th, when it was noted at 80; respiration ranged from 20 to 26. During this time the inhalations were increased from twice to three times daily until the 24th, when she complained of some irritation of the throat from them, and they were diminished to two daily. The hypodermic injections were continued at $\frac{1}{12}$ grain, without any symptoms of iodism, until November 22, when the gold and sodium chloride was used alternately with the iodine every other day. The cough and expectoration was lessened, and from November 27 to the time of her departure from the hospital she did not cough at night at all. Expectoration diminished until the 30th, when upon measurement it was found to be one and one-half ounces in twenty-four hours. She left for her home December 18, with very little cough. December 2 and 17 the sputum did not show bacilli. Appetite good, bowels regular. Advised to take occasionally phosphate of sodium as a laxative. Treatment was continued by her physician, Dr. Johnson, for a short time after her return home. He reported on March 11 that she felt well and appeared strong, scarcely any cough or expectoration, but that he found a few bacilli in the sputum. The physical signs December 15 showed dulness on percussion and noisy respiration over upper right front and weakness of respiration murmur over right back; no râles.

Case VIII.—A. S., aged 40; Canadian; occupation, farmer for last ten years, previous seven years stone-cutter; married; has five healthy children; resides on lake shore in a salubrious situation; uses a good deal of tobacco; takes whiskey and beer frequently.

Family history good. Previous history: He has been well, although subject to taking cold and having attacks of dyspepsia; had ague some time ago. Been coughing for fifteen years more or less in the winter, which cough would leave in warm weather. Never had

hæmoptysis, although has expectorated bloody mucus. Has generally expectorated a great deal of yellowish-green, thick sputum. Never had fever and chills until of late. Had been feeling weaker lately and short of breath for the last year. Has noticed slight emaciation. Appetite poor for the last six months. Not been able to work since the 1st of September, since which time he has had chills and fever almost daily, with pain in the chest and increased breathlessness.

October 23.—Temperature 99.6°, pulse 80, respiration 22. Estimated expectoration, nearly a pint in a day; expectoration contains tubercle bacilli. Voice good; no soreness of the throat. Continual pain in the chest and feeling of constriction, especially after slight exercise. Appetite poor; bowels constipated; tongue coated; skin dry.

Physical Signs.—Laryngoscopic examination showed no change excepting abnormal amount of secretion in larynx. No dulness on percussion on either side; prolonged and jerky expectoration on both upper fronts and over right back. Broncho-vesicular respiration pronounced over right back and just outside of the angle of the scapula on right side, with cavernous respiration and large mucous râles over an area about the size of a turkey-egg.

Treatment.—Lugol's solution with iodine, 5 minims, in extract of malt just before each meal, and the spray of eucalyptol once daily and one ounce of the mixture of chloride of sodium and water, equal parts, three times a day. One drachm of Rochelle salts in a glass of hot water every other morning if necessary, and inhalation from cone inhaler at night with chloroform and ether.

The temperature kept up until October 29, when the morning temperature began to go down to 96.5° and 97°, with a feeling of chilliness. He was given, on the 30th and 31st, hypodermic injections of 6 grains of bisulphate of quinine. On the 31st of October the injection of eucalyptol was discontinued, on account of a slight soreness of the throat; inhalation of one ounce of bichloride of mercury solution, 1 to 3000, was given three times a day, with the face-shield inhaler, for three days, when the chlorine-water inhalation was resumed. Temperature range remained from 98.5° to 99.5° until the 10th, when the evening temperature ran up to 100.5° and the pulse to 98, with no sign of chilliness, however, and no sweating. He is now showing some signs of iodism by increased discharge from the nose, which, however, passed off in a day or so. He now receives hypodermic injections every day, $\frac{1}{8}$ grain gold and sodium chloride, from which time up to the 16th of November temperature never rose above 99.2°. His appetite has now improved; expectoration diminished more than one-half; he felt much stronger; though still short of breath, he could breathe much better. From the 10th to the 16th he was also placed in the pneumatic cabinet once daily for four minutes, during which time the pressure was diminished two inches. On the 16th he was obliged to leave the hospital for home. Hypodermic injections were kept up for a short time. He reported in February as feeling very much better, with very much less cough, especially at night, and very much less expectoration. On the 14th physical exploration of the chest showed evidence of emphysema, but at the region of the right shoulder-blade the large mucous râles have entirely disappeared, and nothing but low-pitched cavernous respiration mark the seat of the breaking down of the lung tissue.

CASE IX.—M. M.; aged 22; native of Canada; printer; single; lives in a cottage in the city, unpaved and shady street; habits good.

Family history good. Has been feeling ill for about eighteen months with dry cough. Pain both sides of chest. Expectoration of yellowish-white, thick sputum, streaked with blood occasionally. Never had any regular hœmoptysis. Had sweating at night lately, although after a coughing spell on first going to bed sleeps very well. Appetite has been capricious and bowels irregular, sometimes constipated, sometimes loose. Has felt sense of growing weakness, being short of breath for the last four months.

December 6.—Transferred from the out-patient department to the hospital. Pale, somewhat emaciated; pulse, 110, small; temperature 100.5°; respiration 40; skin clammy; tongue coated; complains of dull erratic pains both sides of chest. Feels quite weak most of the time; inclined to lie down. Coughs considerably, especially in the evening and morning. Expectorates about half a pint a day by estimation; sputum contains tubercle bacilli. Voice good; no pain on swallowing, no soreness of the throat; no extra discharge from the nose or stenosis. Has not been in any way associated with anybody who had phthisis of the lungs.

Physical Signs.—Dulness on percussion over the upper half of right lung; bronchophony; broncho vesicular respiration with prolonged expiration and increased fremitus over this re-

gion. Large mucous râles and mucous creaking over the right infraclavicular region. At the upper left, creaking respiration with abnormal transmission of heart-sounds; bronchovesicular respiration over rest of the lung.

Treatment.—Inhalation of chlorine gas with chloride of sodium twice a day. Hypodermic injection of gold and sodium chloride, $\frac{1}{60}$ grain, every day, increasing daily to $\frac{1}{8}$ grain, which was reached on the 10th, when it was stopped and resumed again on the 12th in doses of $\frac{1}{20}$ grain, with orders to increase to $\frac{1}{10}$ after the next day, at which time he had profuse sweating, nausea, with dilatation of pupils and vertigo, when the hypodermic injection was stopped. Compound tincture of cinchona, with 5 grains of bone, was given three times a day.

The temperature range was from 97.5° in the morning to 100.5°, 101°, up to December 16. On the evenings of December 8 and 9, however, temperature went up to 102.5° and 101.5°, respectively. Respiration from December 11 to 15 ranged between 29 and 40. He had chills followed by some fever from the 8th to the 14th daily. Nocturnal sweating continued more or less until the second of January. The temperature from December 30 to January 11 ranged between 98° in the morning to 101° in the evening. Respiration varied from 24 to 36. Pulse, however, became less frequent, ranging between 76 and 86. On December 6 he began having hectic fever daily, and on the 7th, 8th, and 9th hypodermic injections of bisulphate of quinine were given, with apparently no effect. He coughed very much at night up to December 9, when cough and expectoration somewhat decreased, the bulk of expectoration growing gradually less. He seemed to hold his strength about the same.

The physical signs showed no improvement, and on the 11th of January there were mucous râles, with increased area of bronchophony over both right and left lung. He left the hospital on January 14, and was feeling stronger and better generally, but there were still numerous tubercle bacilli in his sputum, and the lungs did not seem to clear up. The treatment was not kept up since he left the hospital, and we have heard he is gradually failing.

Case X.—B. J., aged 17; Canadian; doing housework; single; hygienic surroundings tolerably good, though living in a cottage; good habits.

Family history good. Father died of Bright's disease. She has been ill since last Christmas, at which time she caught cold, with cough, expectoration, headache. Coughed and expectorated mostly in the morning. Expectoration yellowish in character. This has been increasing until last month, when she has felt very weak, and suffered considerably with fever and chills. Appetite has been tolerably good; pulse regular; menstruation regular until the last two months, when they were absent. She has not slept well of late at nights. Says she had pleurisy on the left side for two weeks. Never had hæmoptysis; not sweating lately; vomiting and diarrhœa frequently.

December 24.—Appearance healthy; cheeks rosy, not emaciated; respiration 38, pulse 108, temperature 101°; coughs and expectorates a great deal. Expectoration contains much caseous matter and tubercle bacilli.

Physical Signs.—Gurgling and large mucous râles; pectoriloquy over the upper left front and back down to the fourth rib, showing a large cavity in this situation. Bronchophony; bronchial respiration; dulness on percussion over the left front and back; bronchial respiration, but no râles, over the right front and back.

Treatment.—Chlorine inhalation; chloride of sodium twice a day; hypodermic injections of iodine, $\frac{1}{8}$ grain, daily; salicin and malt mixture three times a day before eating; beer and whiskey to drink three times a day; 5 grains of acetanilide every night.

Temperature ranged ftom 97° in the morning to 103° most of the time until December 3, from which time there was a gradual diminution until the 22d, when copious diarrhœa with intestinal pain began, which became practically uncontrollable. During this time the temperature ranged from 99° to 103.5° to 104.5° up to the time she left the hospital, which was February 2.

The hypodermic injections were carried up to 1 grain, which seemed to produce abundant mucous expectoration, aching of the limbs, and increased temperature, and it was changed on the 28th for chloride of gold and sodium, which was used alternately with bisulphate of quinine hypodermically. The chlorine inhalations were kept up until the 9th of January, when they were stopped on account of causing excessive pain in the chest. The examination of sputum on January 5 showed a diminution of bacilli, but some blood. Diarrhœa began about the 18th of January, and continued more or less unabated, notwithstanding the administration of strong astringents. During this time Mosquera's food, meat, and stimulants were freely used, but apparently with no

The physical signs showed a progressive breaking down of the left lung until the time she left the hospital. Gurgling râles, cavernous respiration, and pectoriloquy could be heard almost everywhere over the left side of the chest, while the right side of the chest showed large mucous râles and bronchial respiration and bronchophony throughout the whole upper third. She died at her home on February 12. No post-mortem examination was held.

This case is remarkable for the rapidity of its progression, although undoubtedly more than one-third of the right lung was consolidated at the time of her entrance to the hospital; still the treatment seemed to have no effect whatever in stemming the progress of the disease, although the diminution of tubercle bacilli during the time she was having the chlorine-gas inhalations frequently would indicate a marked result from that form of application.

Case XI.—T. G., aged 40; American; occupation, barber; widower; hygienic surroundings and habits good.

Family history good. He was a soldier in the Union army. Says he has never been very well since. No particular complaint until four years ago, when he began feeling debilitated. Says he has been quite ill for two years with occasional chills and fever, debility, and slight hacking cough. During the past year the cough and expectoration has increased, especially during the winter. Says he had "la grippe," since which time he has been much worse; and last winter had an attack of hæmoptysis, about half a pint having been expectorated; four weeks ago another (about one ounce in quantity), and two weeks ago still another attack (about one ounce). Has had more or less indigestion and diarrhœa for the past eight months. Does not sleep well. Last winter lived in California, but last summer, and up to the time of coming to Harper Hospital, lived in Texas. Appetite has been capricious.

January 12, 1891.—Condition: Tongue cracked and red; mucous membrane of mouth injected, with sensation of dryness; voice good; complains of slight soreness of throat; sputum tenacious, yellowish-gray color; says he cannot sleep on account of cough; bowels loose (three to five stools per day); tenderness and flatness of abdomen. Patient is very much emaciated, and unable to walk more than a few yards. Temperature 100.2° on evening of January 12, pulse 80, respiration about 28.

Examination of sputum, made both January 13 and 15, showed presence of tubercle bacilli. Presence of cavity, shown by pectoriloquy, and cavernous respiration, with dulness on percussion over right infraclavicular and supraclavicular regions. Over left supraclavicular and infraclavicular regions, broncho-vesicular respiration and a few moist râles. Over left infrascapular region there was broncho-vesicular respiration, but no râles. Over right scapular region there were moist râles, bronchophony, and exaggerated murmur.

Treatment.—Injections of iodine $\frac{1}{24}$ grain, gradually increased each day; inhalations of chlorine gas twice daily; pepsine before each meal; Squibb's diarrhœa mixture three times daily after meals; Mosquera's food, one drachm in boiled milk, every four hours. The injection was increased until the dose of iodine reached $\frac{1}{3}$ grain on the 22d, when, symptoms of coryza, dryness of throat, and scantiness of urine coming on, it was substituted by $\frac{1}{8}$ grain of chloride of gold and sodium every night until the 26th; after this $\frac{1}{2}$ grain of iodine and $\frac{1}{8}$ grain of gold and sodium were given on alternate nights. On the 16th and 20th, half an hour after the injection, the temperature rose to 101.5°. On the 25th and 26th, there being nausea and vomiting after inhalation of chlorine, they were stopped for two days, and then resumed. The temperature steadily decreased, excepting from the 16th to the 21st, when the evening temperature was 99.2° and the morning 98°. On the morning of the 24th he had a slight chill, the temperature afterwards reaching 100°. On the 25th, 26th, 27th, and 28th, chilliness each morning, with evening rise from 99.5° to 100°. On the evening of February 5 the temperature rose to 100.5° after an injection of iodine. It also rose on the 7th after an injection. From this time on he rereived the inhalations of chlorine but once daily. From January 5 to February 9 there was a steady decrease of temperature, as well as pulse and respiration rate. From the 14th of February the temperature was never above 99° in the evening, and 98° to 98.5° in the morning, with two exceptions,—viz., on March 5 and 7, respectively, the temperature rose to 100° in the evening, accompanied by slight diarrhœa. A hypodermic injection of bisulphate of quinine was given on the morning of the 7th. From that time the temperature varied from 98° in the morning to 99° and 99.5° in the evening. He had regained much strength, weighed eight pounds more, and could walk about very well. He had very little cough,—in the morning only,—and he expectorated but about two drachms, while the sputum showed no tubercle bacilli.

Physical exploration of the chest at this time showed no moist râles; but creaking coarse respiration over the region of former lesions.

CASE XII.—Miss T. F., aged 21; American; single; has had good hygienic surroundings of late; has been doing housework for the past twelve months. The year previous was clerk in an office.

No tuberculous family history, but father, paternal grandmother, paternal grandfather, and maternal aunt died of cancer, all at advanced ages. She was generally well until last winter, when she was attacked with "la grippe," and was confined to bed four days and disabled for three weeks, suffering from severe cough. In April she became nervous or hysterical, but recovered from this in a few weeks, and resumed work, working hard for about five weeks. In July she was taken sick with *supposed* peritonitis, from which she slowly recovered, and was then "taken down" with so-called "mountain fever," after which she never seemed to have regained her strength. About four weeks ago she began coughing much, and expectorating greenish or yellowish tenacious sputum. She had not menstruated for three months. Her appetite was at first capricious, then almost absent; bowels alternately constipated and loose; sleep very much disturbed by coughing and sweating. She has been growing very weak and emaciated; has considerable pain in chest; never had hæmoptysis.

November 17, 1890.—Condition, weak, pale, emaciated, and able to sit up but for a short time each day; bowels constipated; anorexia; nausea; tongue coated, with red edges; respiration 40, pulse 90, temperature 103.5° (P.M.); has considerable pain through left side of chest and over right hypochondriac region, the abdomen being rather full and tympanitic; considerable cough with abundant expectoration of tenacious yellowish or grayish sputum, teeming with tubercle bacilli.

Physical exploration of chest showed dulness on percussion over whole left chest behind, and upper part of right front; bronchial respiration over upper right, and whole of left side; large mucous râles, and moist crepitation over lower left, behind, left apex, and upper right front; abnormal transmission of heart-sounds and increased fremitus. At right axillary region and at left infrascapular region, gurgling râles and cavernous respiration, with marked bronchophony, and whispering pectoriloquy over a small space of the left mammary region; slight swelling (œdema) of feet.

Treatment.—Hypodermic injections of iodine ⅙ grain, gradually increased to ½ grain; inhalations of chlorine once daily. From 17th to 24th, morning temperature ranged from 98.5° to 99.5°, and evening temperature from 103° to 104.5°. Respiration ranged during this time from 25 to 35, pulse from 90 to 120. On the 23d, at 9.30 A.M., the temperature went down to 97.5°, and rose at midnight to 104.5°. From this time to the 29th the temperature ranged from 98° in the morning to 100° and 101° in the evening. On the morning of the 29th a severe chill, followed by a rise to 104° at 6 P.M. A hypodermic injection of iodine, 1 grain, was given at 6.30 P.M., and from this time to the 5th of December the afternoon temperature did not go above 101°. The iodine was substituted, on the 5th, by chloride of gold and sodium on account of acne appearing. Nocturnal perspiration was excessive most of the time during this period and was controlled by atropia or agarcine. From this time to the 15th the evening temperature ranged at about 101.5°; occasionally 102°. Morning temperature went below 98.5° only three times. Acetanilide was given in the evening whenever the temperature rose above 101°. The respiration gradually diminished up to the 15th, ranging between 24 and 30. Bowels during this time were more or less constipated; tenderness of abdomen kept up more or less of the time; also pain in chest, sometimes severe. After the 15th, hypodermic injections of iodine and chloride of gold were used alternately until the 23d. The inhalations of chlorine were given every other day. Hypodermic injections of bisulphate of quinine were given on the 15th, 17th, and 19th: they seemed to shorten the hectic fever very much. During this time the expectoration was very profuse, containing much pus, also bacilli. From the 14th to the 29th the pulse fluctuated from 90 to 126 and 130. Temperature was also very irregular, and so continued up to January 1. On December 24 and 30 it reached 105°, the following morning going down to 97°, and accompanied by a chill and nausea; respiration was quite regular, ranging from 20 to 26; nausea, and excessive diaphoresis frequent. From the 26th to the 31st she suffered from copious diarrhœa, followed by increased œdema of the feet and great debility. Injections of chloride of gold and sodium were suspended during this period. On January 1 hypodermic injections of gold were resumed, $\frac{1}{10}$ grain being given night and morning up to the 6th. On account of vertigo, nausea, and sense of constriction of body, they were again

suspended. From January 1 to 7 the morning and evening temperature steadily decreased, ranging from about 98.5° to 100°. On the morning of the 7th she had a marked chill, the temperature rising to 104°; after this, expectoration was more copious and yellowish in color; pulse still feeble, ranging from 90 to 110. From the 7th to the 31st she continued to feel much better, the œdema of feet had increased, and there was ascites. Bowels remained somewhat loose; appetite increased. She was given bone-meal and malt ale through December and January with Mosquera's food; was given codeine at night, when necessary, and each hypodermic was preceded by one of cocaine. She steadily progressed without relapses until February 1, when the temperature rose again, expectoration increased, and was accompanied by pain in the chest. On February 7 she again began to improve; on the 13th and 18th she had a high rise of temperature. Ferri carbonate was now added to the bone-meal, on account of the anæmia. Patient was now having one passage of the bowels daily. Coughing had very much diminished, being present in the morning only. Sputum still contained tubercle bacilli. She grew stronger during February, with dropsy disappearing, but the temperature still kept up. Pulse, although frequent, ranging from 90 to 100, was growing in tension. From March 8 improvement still was more rapid. Bowels regular; œdema and ascites gone; appetite voracious; cough almost disappeared, and expectoration amounting to but little more than one drachm daily, of glairy mucous character. Temperature has been steadily decreasing since, and from March 4 to 23 the evening temperature has been about 99.5° to 100° every third or fourth day. Since March 23 it has lowered some, and since the 25th has never been above 99.5°; pulse still frequent but gaining in tension; respiration 20 to 25. Since March 10th she has been walking about the corridors and ward, and says she feels "perfectly well." Sputum on March 20 still showed a few tubercle bacilli.

Physical signs on February 15 showed scarcity of moist râles, and a decided diminution of areas of bronchial respiration with some dry râles. On March 10 no râles excepting dry (creaking and sibilant) in different parts of chest; is rather asthmatic; respiratory murmur, however, was still hoarse. At this writing, March 26, there seems a very good prospect of recovery, she having had no serious relapses for some time. This case seems remarkable, as it had been diagnosed as general tuberculosis by several physicians, and when she entered the hospital no one of the members of the staff who saw her entertained any hope of her recovery. She will leave for her home in the central part of the State in about one week. Menstruation has never recurred. She is now taking bone-meal, with carbonate of iron three times daily, and hypodermic injections once a week. No inhalation of chlorine has been given since March 1, excepting what is diffused in the atmosphere of the ward four times every day.

Case XIII.—Fred. V., aged 28; farmer; married, damp surroundings; poor circumstances.

Family history good. He was never fleshy. Was tolerably well until three years ago, when he began coughing, and has coughed and expectorated ever since, more or less, for the last six months; has had fever and chills, nocturnal sweating, and is losing weight; also micturates frequently; expectoration streaked with blood occasionally, but has never had hæmoptysis. He has never been exposed to pthisical patients.

December 31.—Transferred from out-door department of Harper Hospital. Appearance pale and thin; respiration 32, pulse 86, temperature 101.5°; skin moist; bowels regular; appetite poor; shortness of breath on slight exertion; erratic pain in chest and abdomen; tubercle bacilli in sputum; urine contained oxalates.

Physical Signs.—Chest small; movement short and rapid; respiratory movement diminished; percussion sound high pitched over right side; increased fremitus; bronchial respiration; bronchophony; mucous click and subcrepitant râles over upper right front and back; increased fremitus and bronchial respiration; bronchophony over upper left chest. Laryngeal examination showed very slight œdema of larynx.

Treatment.—Hypodermic injections of iodine, $\frac{1}{12}$ grain, every evening, increasing to ½ grain; chlorine inhalations (two drachms of chloride of lime) twice a day; dilute hydrochloric acid, 10 minims, three times a day before eating; linimentum olei tiglii et olivæ to chest. From December 31 to January 14, temperature ranged from 98° to 98.5° in the morning, and 101° to 101.5° in the evening, reaching 102° on the 7th, 8th, and 10th, after injections of ½ grain iodine on the 7th and 8th. Pulse 108; respiration ranged from 20 to 30 and 34. On the 10th he had pain in the abdomen and was restless; also had diarrhœa, having four stools in the day and two at night, and a watery discharge from the nose. Ex-

pectorates very much, increasing up to the 9th, when it began to decrease. On account of nausea following chlorine inhalations, they were first diminished, then discontinued from the 14th to the 18th, and were then resumed and a smaller quantity of the gas evolved. Hypodermic injections continued on the 18th at 1/6 grain; on the 20th severe nausea and vomiting occurred, and 1 drachm of Hoffman's anodyne was given every night for a few nights; temperature ranged, from the 15th of January to the 10th of February, from 98.5° in the morning to 99.5° in the evening, excepting on the 26th, 27th, and 28th, when it reached 101°; there was very little night-sweating at this period.

Physical examination on the 11th of January showed bronchial respiration, with no râles except on forced inspiration on the 9th of February.

Auscultation showed still more clearing, but with some slight moist crackling over left clavicular region. On the 25th of January the hydrochloric acid was discontinued, and a tablespoonful of malt ale (Parke, Davis & Co.'s) three times a day was given. He is still increasing in strength and has much less expectoration, and the stomach is less irritable. (Received this latter report from his physician March 20, 1891.)

CASE XIV.—Bernard R., aged 63; German; married; occupation, farmer; hygienic surroundings fair; has been in the habit of drinking considerable beer.

Family history good. He has had cough since April, 1890; expectorates considerably, especially in the morning; is growing weaker; having lost thirty pounds in the last four months; has a very poor appetite, sleeps tolerably well, and has no dyspepsia or diarrhœa; "sore throat," especially at night, and hoarseness.

December 30, 1890.—Physical examination of chest showed respiratory movement diminished. Over whole left front and back, prolonged expiration, diminished vocal fremitus; paddle-wheel respiration, heard at the left lower back; broncho-vesicular respiration over the right front. Laryngoscopic examination showed hyperæmia of pharynx and upper larynx, with swelling of arytenoids and epiglottis. Respiration 24, pulse 90, temperature 90°; sputum contained tubercle bacilli.

Treatment.—Inhalations of chlorine from a face-shield inhaler twice daily. January 4, began hypodermic injections of 1/12 grain iodine every day, and bone-meal with malt ale given three times a day. Temperature ranged from 99° to 100° in the morning, and from 102° to 102.5° in the evening, up to January 10; pulse was for a while from 60 to 80; respiration from 20 to 32. The general symptoms grew better; respiration clearer. Temperature ranged from 98.5° in the morning to 99.5° in the evening right along. The dose of iodine was increased to 1/3 grain, which, however, produced eruptions and coryza, with increased soreness of throat, and this dose was therefore diminished. The soreness of throat continued, although the laryngeal swelling and expectoration had greatly diminished. He took the chlorine inhalation very well throughout, and from January 3 to January 12 had at evening a spray of a four per cent. solution of cocaine. He left the hospital January 15, very much stronger, with less cough and expectoration, but with the sputum still showing the presence of a few tubercle bacilli; he was also still somewhat hoarse. He returned February 7, 1891, somewhat worse, having taken a severe cold from being exposed to a storm. His temperature was 99°, and his throat much worse. From February 7 to 16 the temperature ranged from 99° to 99.3°. On the 15th and 17th it was 100.5° and 101°; the latter rise was probably due to the hypodermic injection of 1/2 grain of iodine. He complained of more soreness of throat from the 7th to the 20th. Laryngeal examination showed the larynx to be more hyperæmic and swollen, but showed no ulceration. He took daily two inhalations of chlorine water and solution of salt from the face-shield inhaler. He received hypodermic injections daily of 1/6 grain of iodine from the 17th on.

The temperature gradually grew lower and more even, ranging from 98.5° to 99°, excepting on the evening of the 3d and 4th of March, when he received some depressing news from his home. He left the hospital on March 6, feeling much better, but still complaining of a little soreness of throat. The hypodermic treatment, but not the chlorine inhaler, has been kept up at his home. At the last account, March 20, he was still improving, although temperature was not normal.

CASE XV.—Mrs. M. B., aged 25; American; married; occupation housewife. She had "la grippe" last winter, and has coughed considerably ever since, expectorating a thick, yellowish sputum. Has been worse the last ten weeks. Has complained of pain in the feet for eight weeks, amounting to neuralgia. Appetite good; has constipation; does not sleep well.

Family History.—A sister, aged 21, died

consumption last summer. Father died of inflammation of the lungs, aged 53. Otherwise, family history is good. Menstruation regular, excepting for the last two months.

November 29.—Condition: Not able to be out of bed much. Temperature, 101.2° in the evening, 99.6° in the morning; pulse 100, respiration 26.

Physical Signs.—December 14, bronchial respiration and bronchophony; moist râles over left supraclavicular mammary and axillary region, and over left back, also coarse respiration over whole right lung; analysis of urine showed no albumen casts nor sugar, but pus corpuscles, bile pigment, and mucus; color light and transparent. Examination of sputum, after staining, showed numerous tubercle bacilli; copious perspiration, distressing pain in feet, and cough.

Treatment.—December 1, ammonium iodide, 5 grains, with syrup of tolu, four times daily, was prescribed for cough. On December 10 the patient was removed to phthisis ward, and on December 12, hypodermic injection of iodine (⅙ grain) and atropia sulph. ($\frac{1}{150}$ grain) was ordered every night. From time of entrance, morphia sulph. had to be frequently given for pain and restlessness. On December 13 the injection of iodine was increased to ⅓ grain. On December 19 the temperature went up to 104.2°; pulse 122. She complained of severe pain in right side of chest. On December 20 an injection of gold and sodium chloride ($\frac{1}{10}$ grain) was ordered in place of the iodine. On January 15 ½ grain every day was ordered. Patient continued to be more or less troubled with pain in right side of chest and in the feet. On January 14 he had a severe chill and a hypodermic injection of bisulphate of quinine was ordered. On January 2 extract of malt (2 drachms), spiritus frumenti (2 drachms), and bone-meal (3 grains) was ordered three times daily. On January 19, 3 grains of salicylate of cinchonidia, three times daily, was ordered, and all other medication stopped. On January 21 she had slight hæmoptysis. January 26 (A.M.), temperature rose to 102.8°, and on January 27, a hypodermic injection of gold, $\frac{1}{10}$ grain, every two days; then ⅓ grain. On the morning of February 6 her temperature was down to 98° On February 8 she complained of soreness of throat, and oil of eucalyptol, two drachms three times daily, after meals, was given by inhalation, and a hypodermic of iodine, ½ grain every other day up to February 15, when the hypodermic injections were discontinued for three days on account of diarrhœa. On March 5 a menthol spray (two per cent.) was ordered three times daily for increased odynphagia. Temperature range continued most of the time from 100° to 102°. On February 15 (8 P.M.) it rose to 103.2°; the next morning it went down to 99.2°, then continued from about 101° to 102° until February 25 (A.M.), when it rose to 103°, followed by profuse sweating. March 4 (P.M.) it rose to 103.2°. The temperature also ranged high on March 14 and 15 (P.M.). An examination of sputum on December 18, after staining, showed many tubercle bacilli. On January 19 the character of the sputum changed for the better, showing fewer bacilli. On February 9 and 17 there were still fewer bacilli. On March 5 the bacilli were present in the sputum, but very scarce. Her throat was very sore, the epiglottis, arytenoids, and ventric bands being ulcerated. Her pulse was very weak. She was scarcely able to expectorate, and had great tenderness of the abdomen, and diarrhœa. The skin was constanlty wet, and mouth sore and hot. The emaciation was extreme. During January she seemed to improve very much, cough and expectoration diminished, and she improved in appetite and strength, but from the middle of February on she progressively declined. The laryngeal symptoms came on late. She died March 17. The autopsy revealed tubercular nodules throughout both lungs, in intestines, mesenteric glands, and larynx, with numerous excavations in left lung and fewer in right. There was, however, a notable dryness to the pulmonary tissues. Later on we shall publish fuller details of the morbid anatomy of this and two other fatal cases.

CASE XVI.—F. D. H., aged 36; American; married; had one child; hygienic surroundings excellent; habits good, except that he has used morphine rather freely, sometimes one grain daily for the last three months; occupation, stock-dealer; hard worker; been compelled to give up work entirely for the last two months.

Family History.—Lost two paternal uncles and one aunt from phthisis, and one brother from the same disease. Two half-sisters of his mother also died with phthisis.

Previous History. — Patient never very strong. Between the age of 15 and 17 had four copious hemorrhages from the lungs, but was not much confined to bed until two years ago. Has had frequent hæmoptysis since then, varying in amount from one or two ounces to a pint. Says he has had slight cough since 15 years of age, which has grown much worse lately. Since having had "la grippe," last

winter, has been still worse, with frequent night-sweats. During the past year has had ten or twelve superficial ulcers on the legs, which discharged a week or two before healing; no specific history. Appetite and digestion poor; has not been able to digest milk, oils, or fatty meats; constipated most of the time. Does not sleep well; has more or less pain in chest, and more or less shortness of breath, at times amounting to dyspnœa.

January 29, 1891.—Condition: Very much emaciated; tongue coated; panting respiration; very weak, cannot walk much; skin moist; rather anxious expression of countenance. Respiration 28, pulse 100, temperature 99° (A.M.). Considerable cough, but not a great deal of expectoration. Examination of sputum showed no tubercle bacilli. Urine rather scanty, shows presence of albumen and pus.

Physical Signs.—Bronchial respiration, bronchophony, and prolonged expiration over the left apex, with mucous and sibilant râles all over the supraclavicular and axillary regions; bronchial respiration and mucous and sibilant râles over the left infraclavicular and mammary region and over the left back. There were also dry, creaking râles, prolonged and jerky expiration over upper right front, with coarse respiration behind. Percussion resonance was generally duller all over the chest.

Treatment.—On the night of January 29, owing to pain and dyspnœa, a hypodermic of morphine, ½ grain, was given, followed by $\frac{1}{10}$ grain of iodine. Hypodermic injections of iodine were continued daily, and gradually increased until February 7, when ½ grain was given. This was repeated on the 8th and 9th, when cutaneous eruptions, coryza, and profuse watery expectoration, with dryness of throat, supervened, and it was diminished to $\frac{1}{10}$ grain. A few days later it was increased to ⅙ grain again, and so continued up to the time of his departure. On account of shallow chest expansion, the cabinet treatment was commenced on February 6, at first, once daily for two minutes, with two inches diminution of pressure, and gradually increased to two sittings daily, of four to five minutes each, with a diminution of three to four inches pressure. Temperature ranged between 98° and 100.5° (P.M.) up to February 2, at which time the evening temperature rose to 99°, and on the following day returned to 98.5°. This range of temperature contined, excepting on the 7th and 16th, when it rose to 100° and 100.5°, respectively. On the 16th he suffered considerably from dyspnœa, presenting the clinical appearance of asthma. This asthmatic character continued more or less of the time until his departure, March 9. He had slight hæmoptysis half an hour after leaving the cabinet on February 16. On February 9 physical exploration of the chest showed disappearance of moist râles over the left chest, but dry, crackling râles over left upper front and back, with creaking and jerky respiration over upper right front. Physical exploration on February 16 showed sibilant râles, generally over the left lung, and over upper right front. The pulse ranged between 80 and 100 after February 9, increasing to 110 on the 18th, after a long walk for him. When he left the hospital, March 9, he had gained about eight pounds. His general strength, he said, was better than for two years. He was able to walk half a mile easily, his appetite improved, and his digestion was very much better. He had received no anodyne medication excepting on two or three occasions, and no stimulants except malt ale (Parke, Davis & Co.'s) three times daily. His nourishment for the first two weeks consisted of beef-tea, meat-balls, Mosquera's food, and eggs. The only internal medication he received was 5 grains of bone-meal three times daily, excepting, February 9, 10, 16, and 17, a few doses of salicylate of cinchonidia. At no time were tubercle bacilli discovered in his sputum. No inhalations were given until February 18, from which time inhalations of chlorine were given daily.

This was undoubtedly a case of so-called chronic catarrhal pneumonia. We have heard since his return home that he is still improving. He receives one hypodermic injection a week of ⅙ grain of iodine.

CASE XVII.—K. C., aged 32; Canadian; married; mother of five children; hygienic surroundings have been good; habits good; occupation, housewife.

Family history good. She had "la grippe," she says, last winter, and has not been well since, although always in "good health before." Has had cough ever since, with expectoration, which lately had become quite free. Had hæmoptysis three months ago, when about one pint of blood was expectorated. Felt better for a while after that. Menstruation ceased five months ago. Appetite good most of the time; has had indigestion at times, and constipation continuously. Has not slept well. Has had considerable pain in left side of the chest, not confined, however, to any particular spot.

January 2, 1891.—Respiration 22, pulse 96, temperature 99.5°; poor appetite; constipated; feels very weak, although able to be

up and about. Examination of sputum shows many tubercle bacilli; cough harassing, with "heavy" expectoration.

Physical exploration of the chest showed no appreciable dulness on percussion; respiratory movement rather panting. Large mucous râles, bronchial respiration, and bronchophony at upper right front and interscapular region. Small mucous râles with prolonged expiration over upper left front. Some dulness on percussion in the lower part of the left axillary region.

Treatment.—Inhalation of chlorine gas twice daily; injection of iodine, ½ grain, every evening; bone-meal and malt-salicine mixture three times a day; bromide of potassium (15 grains) at night if necessary; mustard paste on left side of chest. In the morning, January 3, she had a long chill, temperature going down to 97°. First hypodermic injection given on the evening of January 2.

Temperature ranged from 98.5° in the morning to 98.5° to 99.5° in the evening, with the exception of the 5th, 6th, and 7th, when the evening temperature rose to 100.5°. A rise of temperature seemed to follow each injection, and after the 7th the hypodermic injections were given between 4 and 5.30 P.M. No further chill occurred until the mornings of the 23d and 29th. Upon examination by Dr. Carstens, it was found that the patient was pregnant! On this account the dose of iodine by hypodermic injection was never increased beyond $\frac{1}{12}$ grain. On the 10th she began to have considerable nausea in the morning, for which extract of hyoscyamus and bismuth were given, and Mosquera's food every four hours. Evening temperature gradually dropped to 99°, with the exception of the 23d and 30th, when it ran up to 100.5°. The cough greatly diminished, excepting in the early part of the night, when it was quite troublesome. Expectoration diminished so that when she left the hospital, February 6, she did not expectorate more than one ounce in twenty-four hours. The character changed from heavy muco-pus to a frothy mucous sputum. There was no diarrhœa during her stay in the hospital, and improvement of her general strength was quite marked. She left, February 6, very much improved, and went to her home near Buffalo. Since that time she has been under the care of her physician in Buffalo, who reported a short time ago, however, that she was considerably worse. No symptoms of threatened abortion were manifested while at Harper Hospital. It is evident that in this case pregnancy offered no protecting influence. Had we dared to push the treatment, perhaps better and more durable results might have been obtained.

CASE XVIII.—M. B., aged 28; native of Michigan; dressmaker; single; hygienic surrounding good; thin, but of good color; height, five feet three-quarters of an inch; weight, one hundred and seven pounds. Despondent temperament. She had been working very hard, and late at night, for some months.

Family history good. She has been formerly in good health; three and a half years ago she had an attack of sore throat lasting a week, accompanied by soreness of the neck and some swelling of the cervical glands. After that she began to cough slightly, but without expectoration; has continued to cough winter and summer since, but during the last three months her cough has been accompanied by considerable expectoration of a glairy, mucous character. She has been very nervous, and slept poorly for some time past. Appetite has been growing poorer. Has been having chilly sensations and fever on and off irregularly. Menstruation regular. Last two weeks has had fever most of the time. Has had erratic pains through both sides of the chest, more or less, for the last six months, and some shortness of breath upon exertion, which is growing.

December 8.—Respiration 24, pulse 34, temperature 99°; incessant "tickling cough;" skin dry; tongue clean and reddish; bowels regular; fauces soft, doughy; sputum very offensive, containing tubercle bacilli.

Physical Signs.—She had creaking râles and bronchial respiration over the upper left front and back; larynx rather pale and wet.

Treatment.—Salicine and malt mixture three times a day; Mosquera's food and milk three times a day; bromide of sodium at night (15 grains); spray of thymol twice a day in inhaling-room; oleum terebinth applied to chest every night; hypodermic injections of gold and sodium chloride ($\frac{1}{20}$ grain) every night, gradually increased to $\frac{1}{10}$ grain. On the 16th and 17th she complained of excessive pain in the chest, with sense of constriction; also some nausea and continual sweating day and night. The injection of gold and sodium chloride was reduced to $\frac{1}{30}$ grain, and so continued. Expectoration was never very great. It has now diminished to about one ounce in twenty-four hours. From this time to the 26th the cough was very much diminished. From the 22d to the 31st she went into the cabinet every day with two inches pressure taken off. She complained very much of the hypodermic injec-

tions. They seemed to produce neuralgia of the leg on that side. The evening temperature had been 99° up to the 28th, and on the evening of the 29th was 101°. During the night of the 28th and 29th she had four "loose passages" from the bowels. A hypodermic injection of 6 grains of bisulphate of quinine was given, and on the 30th the temperature was 98.5°, and on the evening of the 31st normal. The temperature continued so up to the time she left the hospital. The thymol spray was substituted on the 14th by chlorine inhalation once a day, which was continued until the 27th, but as it seemed to cause severe coughing afterwards, it was given every second day only.

When she left the hospital, February 20, she was still troubled with tickling cough and a feeling of tightness of chest, but had very little expectoration, in which no tubercle bacilli was found. She was stronger, ate well, and digestion was good, we saw her a week or two afterwards, when she seemed to be still improving. After this she went South to visit a relative, and we have not heard directly from her, but indirectly that she is quite well.

CASE XIX.—N. L., aged 21; American; clerk; single; lives in a village; sanitary surroundings good.

Family history good; habits good. He was very well until two years ago, when he began suffering from hoarseness at night, with slight cough and expectoration. For the last year these symptoms have been growing worse. He never had hæmoptysis; never has been exposed, as far as known, to phthisical patients; has been growing weak generally during the last six months, and has had more or less soreness of the throat, with hoarseness.

September 14.—Looks thin and sallow; pulse 118, temperature 99.5°, respiration 22; considerable cough and expectoration in the morning. Sputum showed no tubercle bacilli. No pain in the chest, no dyspepsia, but "liable to diarrhœa;" no extra discharge from nasal passages; no stenosis. Conscious of fever, especially at night; nocturnal sweating two or three times a week. Laryngoscopic examination shows pharynx reddened, larynx hyperæmic and wet. Not much hoarseness; no odynphagia now.

Physical examination of the chest shows diminished chest movement, percussion resonance good.

Auscultation.—Broncho-vesicular and bronchial respiration in patches over both sides; moist râles at the upper right front, with increased fremitus.

Treatment.—On account of the suspicion of specific infection, he was "put upon" inhalations of biniodide of mercury, 1 to 3000, and was given hypodermic injections of bichloride of mercury, $\frac{1}{20}$ grain, every other day, gradually increasing to $\frac{1}{12}$ grain. This continued until the 30th of September, when, the bowels becoming loose (seven passages daily), this treatment was discontinued, and he was given chlorine inhalations and tannate of quinine (3 grains) internally, every three hours, with 1 grain of pulv. opii at night, until the bowels were checked. He was given a teaspoonful of Mosquera's food and milk alternately every two hours, and insufflation of iodoform to the larynx. Temperature up to this time had ranged from 98° in the morning to 99.5° in the evening. On the 29th the temperature rose to 100.5°; pulse was 110 and feeble. Evacuation of bowels becoming more frequent, the temperature declined, and from the 3d to the 12th the evening temperature was normal, with the exception of the evening of the 8th, when it rose to 100°. This occurred after a hypodermic injection of $\frac{1}{4}$ grain of gold and sodium chloride. The further treatment consisted of the hypodermic injections of gold and sodium chloride, and tannate of quinine and bismuth internally, with inhalations of chlorine water and sodium chloride from face-shield inhaler. On October 2 the odynphagia was increased; also the hyperæmia of the pharynx and upper larynx. Insufflations of iodoform with morphine were given every night up to the 9th, when this condition seemed to abate. The Mosquera food and milk was kept up during the time he was in the hospital, and when he left (October 18) he was very much improved in every way; strength good, etc., temperature had been normal most of the time for the last ten days; cough and expectoration was very much less, and no tubercle bacilli in the sputum. A week or so after leaving the hospital he went South, and seemed to do very well until December, when he contracted what was said to be a remittent fever. From this time on he became rapidly ill, losing flesh and strength; the cough returned, with considerable expectoration, also soreness of throat and loss of voice. He returned to Harper Hospital March 12, where he now is. Expectoration contains tubercle bacilli. His condition on entrance was quite grave; he was very much emaciated; temperature 101°, pulse 110, respiration very rapid (28), with considerable cough and expectoration, diarrhœa, and anorexia; very hoarse, and suffering odynphagia. Examination of the chest shows bronchial respiration and bronchophony in

both upper fronts, with cavernous respiration and gurgling in the left infraclavicular region, demonstrating a softened spot probably the size of a turkey-egg. Examination of the left back shows also a softened spot, as evinced by much gurgling, mucous râles, and pectoriloquy. Laryngeal examination shows no ulceration of larynx, but swelling and hyperæmia. He is now receiving hypodermic injections of iodine, ⅓ grain, taking bone-meal and malt ale every four hours, with liberal soft diet, meat, eggs, etc. He also gets the chlorine inhalations three times daily. It is necessary to give him astringents and anodynes more or less to allay diarrhœa. This case is instructive in showing the danger of relapse when a plan of treatment is stopped too soon.

CASE XX.—N. S. M., aged 22; American; housewife; married; no children; hygienic surroundings always good.

Family History.—Father died of acute phthisis, aged 40; otherwise family history good. She was never very strong or fleshy, but well until three years ago, since which time she has been ill more or less. Has had pain in the back, below the scapula, a great deal. Gradual loss of weight; weakness increasing; is not apt to take cold; has had more or less cough, for the past year and a half accompanied by expectoration of sputum, sometimes frothy, sometimes yellow and heavy. Says she had "la grippe" last winter, and has felt very much worse ever since. Had hæmoptysis last May, losing about four ounces of blood. Stomach has been irritable; suffered from indigestion, with vomiting, especially mornings and evenings. Appetite capricious; bowels irregular, constipated and loose alternately. Menstruation has continued, but of late has been growing scanty. Has not slept well for some months; apprehensive and nervous; has had night-sweats on an average two or three times a week for the last six or eight months. Has not been with anybody suffering from phthisis pulmonalis. Has never consumed much fresh meat or milk.

December 27.—Respiration 30, pulse 90, temperature (P.M.) 102°; skin moist, very white, and soft; tongue furred; bowels move twice a day; nausea now; very weak, unable to walk very far; trembling of the muscles, constant on exertion; erratic pains about the chest; tenderness of the abdomen; slight œdema of the feet.

Physical Signs.—Bronchial respiration, and pectoriloquy over upper right front; cavernous respiration; gurgling mucous râles over upper left front and back; broncho-vesicular respiration over right back; dulness on percussion; resonance of high pitch over the right upper right front and back.

Treatment.—Bone-meal, with malt ale, four times daily; chlorine inhalation (five minutes in inhaling-room) morning and evening; hypodermic injection of gold and sodium chloride, $\frac{1}{20}$ grain, every night; glass of hot water every morning early. On the evening of December 28 the temperature rose to 102.5°, falling to 97° the following morning. After an interval of three days, when the temperature ranged from 99° to 101°, it again rose to 103.2° in the evening, and kept up until about four o'clock in the morning, when a gradual subsidence took place until eight o'clock, when it was 98°. From this time up to January 28 there was a general lessening of "hectic fever," the main rise of temperature taking place at intervals of about three, four, and five days, and from February 1 the temperature gradually diminished until February 12, obtaining a range of 98° to 101.5°. Diarrhœa came on at intervals during the period of her stay in the hospital. The pulse gradually grew more frequent, with some loss of tension. After January 22 until February 14, when she left, her pulse was from 90 to 110. Tenderness of the abdomen seemed to increase, and also œdema, during the last two weeks of her stay in the hospital. After the first three weeks of treatment the expectoration diminished, as also the cough, and there was an improvement in the appetite and digestion, but this soon gave way to exacerbations of fever, diarrhœa, and anorexia. On account of severe neuralgia excited by the hypodermic injections, they were discontinued on January 4 until the 10th, and after that given only every other day. The hypodermic medication with this patient consisted entirely of chloride of gold and sodium. During the first two weeks the injections not only excited neuralgic pains spoken of, but, when $\frac{1}{8}$ grain was given, produced vertigo, nausea, and feeling of constriction about the waist, which lasted from one to three hours. The patient left the hospital for her home February 14, and, according to report, died about March 1. No autopsy was held. Although gaining strength, and apparently improved during the first three weeks of her stay in the hospital, during the last two weeks she seemed to gradually fail. However, when she left she did not show much more weakness than when she entered. This was undoubtedly a case of advanced general tuberculosis. Besides the special treatment, there was, of course, instituted a various range of symptomatic treat-

ment, consisting of the administration of acetanilide, bromides, codeine, pepsin, pancreatin, tannate of quinine, etc. The stimulants used were principally the malt ale of Parke, Davis & Co., eggnog, milk-punch, etc. At no time were the tubercle bacilli absent from the sputum.

One noticeable feature in the treatment of this case was the tonic effect of the gold and sodium, which lasted sometimes for half a day.

CASE XXI.—D. V., aged 11; American; female; domiciliary surroundings damp.

Family history bad. Has one sister suffering from tuberculosis now, and has lost one sister with this disease. She was never a strong child. When a few months old she had so-called congestion of the lungs; has been weak and more or less ill ever since. When six years of age, she had whooping-cough; since that time has coughed more or less. Appetite capricious; more or less fever and chills; persistent diarrhœa, two to four watery movements daily. Considerable cough and expectoration during the cold months of the year.

January 5.—Respiration 40, and panting; pulse 130, temperature 102°; very much emaciated and of waxy appearance; sputum copious, markedly offensive, and contains many tubercle bacilli.

Physical Signs.—Excavation in places over both lungs; gurgling râles, pectoriloquy, and cavernous respiration, marked throughout the left and upper part of the right lung.

Treatment.—Bone-meal, carbonate of iron, of each 3 grains, every four hours; milk-punch four times daily; beef-balls; unguentum iodidi comp. applied to chest every night; hypodermic injections of chloride of gold and sodium, and aromatic spirits of ammonium two or three times during the night.

This patient remained in the hospital from January 5 to January 24, progressively growing weaker; temperature never getting below 100° but twice,—on the 12th and 19th,—and then ran down to 97° in the morning; evening temperature ranged between 102.5° and 104°; respiration grew more rapid, dyspnœa great; no marked effect of treatment was noticed. Diarrhœa was kept under control by tannic acid, tincture of opium, and finally nitrate of silver and opium.

CASE XXII.—Carrie V., sister of D. V., aged 20; American; single.

Family history bad. She was well until two years ago, when she began to grow pale and emaciated. Has had cough since last winter. Before that, for about six months, she was troubled with hawking and considerable hoarseness; subject to colds; never had hæmoptysis; has had dyspepsia and diarrhœa more or less during the last year, which during last summer was quite persistent; has had night-sweats frequently since last September; no menstruation for six months.

Physical Signs.—December 29, 1890, gurgling mucous râles and pectoriloquy over upper right back and front; bronchial respiration; bronchophony over upper left. Pale, waxy appearance; very much emaciated; very weak, unable to sit up more than half an hour or an hour at a time; bowels tender, tympanitic, and "loose;" evacuations watery; expectoration copious; cheesy, and teeming with bacilli; swelling of both feet and ankles; pulse small, thready, 112; respiration 30, temperature 102°; anorexia persistent; dull and sleepy.

Treatment.—Mosquera's food (1 drachm) every two hours; 2 drachms of whiskey, 10 minims of chloranodyne, with 5 grains of tannic acid every four hours; hypodermic injections of gold and sodium chloride ($\frac{1}{15}$ grain) morning and evening. The dose of the injection was gradually increased to $\frac{1}{10}$ grain twice a day and $\frac{1}{8}$ grain once daily. No reaction seemed to follow, excepting after the one of January 5 a sense of increased strength came to the patient, lasting three or four hours. This occurred after each injection for a while. There was also slight diminution of the œdema of the feet noticed. The injection seemed to have no effect on the temperature whatever; regular hectic fever, with temperature rising to 102.5° and 103.5° every evening, and 97° to 98° every morning, continued. During the time of the injection of $\frac{1}{8}$ grain of gold and sodium it was noticed that the nocturnal sweating increased. No change in the quantity of bacilli in the sputum took place. Patient left the hospital January 24 with her sister, since which time they have not been heard from.

CASE XXIII.—S. S. P., aged 30; native of Michigan; residence on the shore of Lake Huron; habits good; occupation, lawyer, with very little out-door life.

Family History.—Father died of phthisis, and two brothers of pneumonia (?) or phthisis. One brother living, healthy, aged 36; maternal relatives healthy. He was never very fleshy, but tolerably well; had hæmoptysis twice last spring, not very much in amount each time; chills and fever more or less ever since. Began to cough last February; dated it to an attack of "la grippe," and has coughed since and expectorated considerably, especially in

the morning. Has suffered more or less with indigestion, but no diarrhœa; has had no nocturnal sweating.

August 11. — Present appearance spare; height, five feet seven inches; weight, one hundred and thirty pounds; pulse 100, temperature 99°, respiration 20; coughs considerably, but slight expectoration, white in color; pain in right side of chest on and off, not aggravated by movement; sleeps well; nasal passages not obstructed and only occasional extra discharge; has pain, odynphagia, and hoarseness lasting for two or three days at a time.

October 25.—Physical exploration of the chest shows slight dulness over upper right front, prolonged jerky expectoration, exaggerated vocal resonance; laryngoscopic examination shows the whole larynx hyperæmic, with some extra mucus; no particular swelling of the arytenoids; sputum contains a few tubercle bacilli. He consulted me again, at the office, on October 25, and the cough had continued since I saw him. He thought he felt a little weaker; had not had night-perspiration much since last visit, and his appetite was tolerably good and his bowels regular, although he did not sleep as well; he had been troubled some at night by a cough; expectoration a little more than formerly; also some increased pain in the chest; breath shorter.

Physical signs at this date: Bronchial respiration and bronchophony very pronounced, with moist râles over upper right front; exaggerated murmur on the left side; expectoration contains tubercle bacilli. He entered the hospital November 1, his condition as follows: Respiration 28, pulse 88, temperature 98°; this was about noon. At 8 P.M. this date, the respiration was 30, pulse 96, and the temperature 99.5°. He perspired easily upon exertion; appetite quite poor, with slight nausea; bowels regular; tongue somewhat coated. He complained of some slight soreness in swallowing; voice a little husky. Laryngoscopic examination showed the pharynx and fauces quite red, with abundant secretion in crypts of tonsil. Upper larynx also red; vocal cords brownish white; not much swelling.

Prescribed for him bismuth (fifteen grains) half an hour before meals; inhalation, in inhaling-room, of eucalyptol, 1 ounce, twice a day, with inhalation from face-shield inhaler of the spray of bichloride of mercury, 1 to 3000, once daily before eating; Mosquera's food in the afternoon, evening, and at bedtime. On November 3 inhalation of chlorine gas was prescribed, but, on account of the production of severe cough and irritation of throat, it was discontinued, and the bichloride of mercury and eucalyptol was resumed. On November 6 he received a hypodermic injection of iodine, $\frac{1}{12}$ grain. This was continued every night until the 11th, when it was increased to $\frac{1}{8}$ grain, and on the 14th to $\frac{1}{6}$ grain. Coryza, discharge of the nose, and slight diarrhœa with cutaneous eruption having appeared on the 15th, the dose was reduced to $\frac{1}{12}$ grain. Range of temperature up to the 12th of November was from 98° in the morning to 100.2° in the evening. November 7 to 19 it decreased by 98.5° in the morning to 99.5° in the evening, excepting on the 14th and 16th, when it went to 97° in the morning. On the 18th, the time of the last $\frac{1}{4}$-grain hypodermic injection, the temperature rose to 100.5° and remained for about four hours, gradually decreasing, however, and not rising again, except on the 23d, when there was a slight rise again for an hour. From November 14 to 24 he was put in the cabinet twice a day for three minutes each time. The examination of sputum just before leaving the hospital showed no tubercle bacilli present; the respiration was very much improved, the general strength had returned, the appetite was good, the bowels quite regular, and he slept pretty well all night; the cough had pretty nearly ceased; expectoration amounted to no more than two drachms on that morning; the physical signs showed no râles, but slight coarse respiration of the upper right front. Soon after leaving the hospital he went to Arizona for the winter, where he has since been, and at last report from him (two weeks ago) he had been steadily gaining in weight and had little or no cough. He considered himself perfectly well.

CASE XXIV.—Mrs. D. H., aged 36; American; housewife; widow; four children; domiciliary surroundings good; habits good; has always worked at housework.

Family history good. Husband died of consumption three months ago; attended him and did her housework besides. Was always well until about three months ago, when she began to have a dry, hacking cough, followed by pain in the left side of chest and severer coughing; and then began to expectorate yellowish, thick sputum, which gradually grew whiter and thinner. Expectoration occasionally streaked with blood, but never had hæmoptysis. Appetite fair; bowels regular; menstruation regular; sleeps well, excepting for cough and slight sweating.

January 2.—Looks pale; not thin; slow of movement; slight swelling of the feet, especially in the evening; some dyspnœa on exertion; respiration 28, pulse 110, temperature 100.5°; expectoration not profuse, contains tubercle bacilli and pus. Examination of urine on the 3d revealed the presence of albumen, granular casts, pus corpuscles, and urates; reaction alkaline; specific gravity 1010. Voice all right; no odynphagia.

Physical Signs.—Slight dulness on percussion over upper left front and back; bronchial respiration, bronchophony, with mucous râles over upper left front down to the fourth rib and over apex behind; loss of vesicular quality and subscapular râles over right apex; vesicular quality weak.

Treatment.—Bone-meal and malt, with two drachms of whiskey, three times daily; Mosquera's food and milk between meals; hypodermic injection of iodine, $\frac{1}{12}$ grain, to be increased to $\frac{1}{6}$ grain gradually.

Temperature ranged from 98° in the morning to 100.5° to 101° up to the 11th, when the morning temperature was 97°, and at 2 P.M. it was 101.8°, and at 8 P.M., 102.2°. At this time she was receiving $\frac{1}{6}$ grain of iodine. Puffiness of the feet was still present, with no change in the urine excepting that it was less in quantity; expectoration diminished, and more "shortness of breath;" bowels "loose" from the 11th to the 14th. The iodine was now substituted with chloride of gold and sodium, $\frac{1}{10}$ grain, and, instead of the bone-meal and malt formerly given, dilute (15 minims) nitro-muriatic acid was given in water before each meal. Nourishment continued the same. January 15, malt ale was given three times a day with 10 minims of tincture of capsicum, and the nitro-muriatic acid was discontinued on account of redness of tongue. Anorexia seemed to be complete. Evening temperature gradually ranged from 98.5° in the morning to 100.2° in the evening until February 5, when the evening temperature reached 102.8°. Inhalations of chlorine were kept up from January 10 to the time she left the hospital, nausea and vomiting following the use of chlorine twice only. She was able to take two and sometimes three inhalations of chlorine gas daily very well, without excessive coughing at any time following. On February 3 examination of sputum showed absence of tubercle bacilli and great diminution of expectoration and cough. The anorexia, however, remained, and there seemed to be no marked increase of strength, but a falling of body-weight. The physical signs showed absence of râles, broncho-vesicular and bronchial respiration remaining. Examination of urine still disclosed presence of albumen and casts, but these were fewer and broken; the œdema was lessened. She returned to her home in Chicago in February, since which time we have not heard from her, although we suppose her physician is keeping up the treatment. We found no tubercle bacilli in the urine.

Case XXV.—Mrs. E. L., aged 29; American; widow five years; husband died of pneumonia; hygienic surroundings good; has not taken good care of herself, having kept late hours, attended entertainments, etc.; been telegraph operator for four years, and worked hard.

Family History.—Mother lost three sisters of phthisis pulmonalis; father died of pneumonia, aged 56; nephew died of phthisis; one sister died of pneumonia. She was generally pretty well, though very nervous, until last winter, when she was seized with "la grippe," followed by pneumonia, from which she was ill in bed five weeks, after which she went to Chicago, where she improved until September, 1890, when, while travelling, she took a severe cold, and has since felt worse. She has been coughing since last winter, sometimes expectorating very little, at other times freely. Had hæmoptysis first last January, expectorating then three ounces of bright aerated blood. This has frequently occurred since (expectorating thin blood), but usually just preceding menstrual period. She had "chills and fever" on and off for the last few months, and also what she calls "fainting spells." Capricious appetite; does not digest food easily; vomits often; diarrhœa and constipation alternately. Never sleeps well; has nocturnal sweating more or less.

January 18.—Respiration 36, pulse 80, temperature 99°; very restless and nervous; skin moist; tongue coated; bowels regular; not much appetite; feeling of emptiness at epigastrium; erratic pains about chest and abdomen; feels very weak, unable to walk very far; after exertion perspires freely, and has dyspnœa; a few tubercle bacilli in sputum.

Physical Signs.—Dulness on percussion, and bronchial respiration over upper third of left lung, with moist crackling at apex.

Treatment consisted of compound tincture of gentian with bone-meal three times per day; glass of hot water every morning; hypodermic injection of gold and sodium ($\frac{1}{10}$ grain) at night; solution of bromide of potassium (10 grains), also at night; chlorine inhalation once daily (fifteen minutes in inhaling-room);

inhalation of ether and chloroform at night, if necessary to allay cough. The first hypodermic injection was followed by slight nausea, and pain through both limbs and back. After this there seemed to be no further disturbance from the injections, the dose of which was gradually increased up to the 31st, when she received ⅛ grain. This was followed by vertigo and dilatation of pupils. On February 1 the same symptoms followed a like injection, with considerable nervous irritability in addition. The dose was lessened to $\frac{1}{10}$ grain, which was given every night until the 7th of February. On account of copious perspiration, the hypodermic injection was omitted until the 10th, and from that time $\frac{1}{10}$ grain was given every other night.

The range of temperature varied from 98° to 100.5° up to the 1st of February. From that time it gradually decreased. On the 4th and 5th of February it remained at 98° nearly throughout the twenty-four hours, which was probably occasioned by a diarrhœa excited by eating some nuts. During the forty-eight hours just mentioned she had seventeen movements of the bowels. This condition was checked, and the temperature soon became normal, although the bowels remained "loose" up to the 12th of February. On the 10th and 12th of February the evening temperature went up and remained for about an hour at 101°, and on February 13, after an injection of ⅛ grain of gold and sodium, temperature went up to 104.2° for about an hour. Her bowels continued "loose" during the time that she remained in the hospital. Examination of sputum February 11 showed scarcely any bacilli. She had very little cough, excepting at night, and very little expectoration. She was obliged to leave the hospital on account of some domestic matters, and returned to her home, where her treatment was kept up for a while by her family physician. We have not heard from her since about the 2d of March. She was then doing well.

Physical exploration of the chest on February 26 showed absence of moist râles, but instead sibilant and creaking. Other signs the same.

Case XXVI.—Mrs. C. C., aged 30; native of Ohio; married; two children; hygienic surroundings tolerably good; habits good, although she has always worked hard.

Family history good. She has been complaining for eight years of "stomach disorder" of one sort or another; before that she was generally well. Has not had any uterine disease of any sort. Has been coughing more or less (especially mornings) for three years. Has taken considerable medicine. The sputum on two or three occasions was streaked with blood, but she never had any real hæmoptysis. Generally had pretty good appetite; bowels regular; has slept well. Menstruation for last year has been rather irregular.

January 28.—Respiration 28, pulse 100, temperature 99°; feels quite weak, looks pale; wants to lie down the greater part of the day; perspires easily; very little appetite; bowels constipated; some headache; pain in back part of chest. Has considerable cough and expectoration, which is thick and contains much offensive matter, and tubercle bacilli.

Laryngoscopic Examination.—Mucous membrane of larynx and pharynx somewhat pale. Physical exploration of the chest shows dulness on percussion, and sibilant râles over upper left front and back. Bronchial respiration and bronchophony, but no moist râles over the upper right front and axillary region. The right back shows diminution of respiratory murmur, with high-pitched, prolonged expiration.

Treatment.—Hypodermic injections of iodine, $\frac{1}{12}$ grain; inhalation of chlorine gas (1 drachm of chlorinated lime) three times a day; cone inhalation of spirits of chloroform and ether at night to allay cough; compound tincture of gentian, two teaspoonfuls three times a day before eating; glass of milk between meals at dinner and evening; phosphate of sodium, 20 grains, occasionally, in the morning in hot water, as a laxative.

The temperature on the evenings of the 8th, 9th, and 10th was only 99°, but from the 11th to the 15th the evening temperature rose to 101.2°; morning temperature 98.5°. There was also some increased salivation on the 14th; also eruption of the skin, with slight coryza, and diminution in quantity of urine and expectoration. The injections had reached ⅛ grain. From the 15th the iodine was diminished to $\frac{1}{10}$ grain, and continued at that until the 27th of January. During this time the temperature ranged from 98.5° in the morning to 99.8° and 100° in the evening. The expectoration, which was at first diminished, began increasing rapidly; there was a great deal of cough in the evening and during the night. The extra discharge from the nose continuing, on January 28 a spray of Dobell's solution was used through the nasal passages. On the 18th she complained of feeling somewhat weaker, which could not be accounted for, but the next day this sensation seemed to disappear. On January 27 ⅛ grain of iodine, and on January 28 ¼ grain, was administered

hypodermically. The symptoms of iodism came on again, but with less violence, and the injection was now changed to chloride of gold and sodium, $\frac{1}{10}$ grain. This was continued up to February 5, when $\frac{1}{8}$ grain was given; February 6, $\frac{1}{8}$ grain was given, which produced perspiration, some diarrhœa, a feeling of constriction about the body, and headache. These symptoms lasted about four hours. The dose was diminished to $\frac{1}{10}$ grain, and continued to February 12, when a hypodermic injection of $\frac{1}{8}$ grain of iodine was given instead of the gold. In the mean time the expectoration had greatly diminished. The temperature range continued from 98.5° in the morning to 99.5° in the evening, once in a while going up to 100°, until she left the hospital.

February 18.—The cough and expectoration greatly diminished, occurring only at night. Her strength was greatly increased. The color of lips and mucous membranes generally better. Laryngoscopic examination showed the mucous membrane of the larynx and pharynx still a little pale. Appetite was better and bowels regular. The physical signs showed a very decided clearing up of the bronchial respiration, and bronchophony over the right lung. Sibilant râles and creaking were still present over the upper left, and also some creaking râles over the upper right. The examination of the sputum on the 17th of February showed still a few tubercle bacilli present. The treatment had been continued by her physician at home, who uses two or three hypodermic injections a week of the iodine and gold and sodium alternately, and the last report shows that the patient has continued to improve steadily since leaving the hospital.

Case XXVII.—P. T., aged 32; native of Michigan; married; has one healthy child; farmer; always worked very hard until becoming ill. Habits good; always smoked and chewed moderately.

Family history good. He says he was always well until attacked by "la grippe" last winter, since which time he has felt weaker, and has had more or less cough and hoarseness ever since. He is worse in the morning, at which time he expectorates considerable. Appetite has been fairly good; bowels regular; has slept well, excepting for cough. Never had hæmoptysis. During last winter he had chills and fever more or less all the time. He has been hoarse, he thinks, for nearly a year.

January 29.—Looks very well in the face, though pale; six feet in height; former weight, one hundred and sixty-five pounds; present weight not known. He has considerable cough and expectoration in the morning; slight pain on swallowing; more or less hoarseness, which is worse in the afternoon and evening; pain in the left side of chest; no indigestion or diarrhœa; not much extra discharge from the nose; no nasal stenosis; has not "lost very much flesh" during the last year, but is conscious of being weaker. Respiration 26, pulse 80, temperature 100.2°.

Physical Signs.—Sputum teeming with bacilli. Laryngoscopic examination shows both arytenoids quite swollen and red; larynx very wet, but no erosions noticeable. Percussion dull over both upper fronts and also left back; small cavity in the upper right apex as evinced by whispering pectoriloquy, cavernous respiration, and occasional thick râles; over the upper left front there are a few moist râles; bronchophony and bronchial respiration also at the left apex behind. There was broncho-vesicular respiration, with diminished fremitus, at the lower left back, and prolonged expiration; creaking and sibilant râles in the left scapular and left mammary region; increased percussion resonance over right back.

Treatment.—Hypodermic injection of iodine ($\frac{1}{8}$ grain) every day. Inhalation of chlorine gas (twenty minutes in inhaling-room) twice a day; bitartrate of potassium, $\frac{1}{2}$ drachm in a glass of water, every morning; beef-tea; milk three times a day between meals; bone-meal twice daily. From January 29 to February 2 the evening temperature rose from 100.5° to 101°, and the morning temperature from 98.5° to 99°. Voice became more husky, almost aphonic; increased soreness of the throat amounting to odynphagia. Laryngoscopic examination showed no increase of hyperæmia, but increase of secretion. Expectoration also increased and became a watery mucus. The dose of iodine was now reduced to $\frac{1}{12}$ grain. On the night of February 3 an insufflation of iodoform and morphine was given to allay soreness of throat. From this time on the temperature gradually decreased, the evening temperature never going above 100°, and the morning temperature being from 98.5° to 99°, excepting on the morning of February 9, when it went up to 100°. He complained of more soreness across the front of chest at this time. The voice gradually grew better, although remaining hoarse, and pain upon swallowing rapidly diminished. He took a hypodermic injection of $\frac{1}{8}$ grain of iodine from this time on to the 18th, when he left the hospital. From the

11th to the 18th the temperature remained normal, and the pulse between 84 and 90. Examination of sputum on February 16 disclosed only a few tubercle bacilli present. The expectoration had diminished to about half an ounce in the twenty-four hours. Urine was highly colored, but contained only an excess of phosphates and muriates.

Physical signs on the 9th showed diminution of consolidation over the chest, and instead of moist râles at the upper right chest there were sibilant râles; although there were moist râles still at the upper left front, they were much less marked, and were replaced largely by creaking and sibilant ones. The swelling of the arytenoids was very much less, no erosion, and hyperæmia very much diminished. He was obliged to leave the hospital on February 18 on account of some matters pertaining to his farm, and returned to the hospital again in March, having been very well until three or four days before his return, when, by getting his feet wet, he took a severe cold, which increased the hoarseness and brought about a return of the odynphagia, with some increase of cough and expectoration. He, however, looked very well, felt strong, had a good appetite, and coughed but little. He expectorated about an ounce in twenty-four hours. The sputum on entering the hospital again showed a very few bacilli, but at this time (March 23) they have entirely disappeared from his sputum. His temperature varies only about half a degree between morning and evening. His voice is still hoarse, and there is some thickening of the laryngeal mucous membrane yet. He is still under treatment in Harper Hospital, and receives an injection of iodine, ⅓ grain, and gold and sodium chloride, $\frac{1}{10}$ grain, on alternate days. He gets one inhalation daily, through the face-shield inhaler, of chlorine water and solution of chloride of sodium.

HEAT PHENOMENA IN CURARIZED ANIMALS.

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(Continued from page 159.)

Part II.

THIRD SERIES.—*The Actions on Heat Production and Heat Dissipation.*—Since the maintenance of the mean temperature of the body is dependent upon the reciprocal relations existing between the processes of heat production and heat dissipation, the causes of the temperature alterations in the curarized animal are to be sought in actions on one or both of these.

A number of investigators, taking the absorption of O and the elimination of CO_2 as indices of tissue metamorphosis, and consequently of heat production, assert that the activity of this process is diminished; but such methods, as I have already pointed out elsewhere, are far from being reliable. The only means upon which we can place absolute reliance is direct calorimetry, which has the additional advantage of enabling us to study coincidently the effects on heat dissipation. The only calorimetrical experiments on record were performed by Kemp (*loc. cit.*) in our laboratories. These comprise fourteen observations on dogs, each of which was conducted generally for two hours,—one hour with the normal animal and the other with the animal curarized. In several instances, however, the studies in the curarized condition lasted for two consecutive hours. The doses employed varied from what was just sufficient to cause paralysis of voluntary motion to quantities largely in excess. In summing up these results, together with those of his observations only on the temperature, he reaches the following conclusions:

"The injection of small doses of curare is followed by a rise in temperature.

"After the injection of larger doses the bodily temperature falls. This fall is preceded, however, by a rise more or less marked.

"The rise from the small dose is brought about by an actual increase in the heat production of the body.

"The fall, while sometimes aided by vasomotor phenomena, which cause increased heat dissipation, is regularly due to a lessening of the amount of heat produced."

These experiments, therefore, show that the increase of temperature is coincident with an increase of heat production, and the diminution of temperature to a decrease of heat production and an increase of heat dissipation.

My own experiments, which were pursued on a more elaborate scale and with a greatly improved instrument, are in essential respects in accord with Kemp's, but some new facts have been elicited. Thus, I have found that when an increase of temperature occurred, both heat production and heat dissipation were usually increased, the former being, of course, in excess. In experiments in which

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the temperature was diminished, sometimes heat production was diminished and dissipation increased, and in others heat production was not in the least affected, the fall being solely due to an increase of heat dissipation. The temperature may be profoundly affected without heat production being in the least altered. In some experiments the fall during the first hour was due to a decided diminution of heat production, associated with an increase in heat dissipation, while during succeeding hours heat production would be normal and the temperature continue to decline, owing solely to a persistent continuance of the increase in heat dissipation. In curarized animals, as well as in those in a normal condition, the alterations in temperature are by no means reliable indices of the actions on one or the other of these processes, yet it may be stated with positiveness that when a decided rise of temperature occurs, heat production is primarily the process affected; and that a fall of temperature almost with certainty indicates a dependence upon increased heat dissipation — a diminution of heat production being altogether a subsidiary factor, unless the dose has been unnecessarily large, or when the decrease immediately follows the injection.

In the six experiments included in the present series no primary increase in temperature occurred, but always a more or less decided diminution. Animals were chosen for this work in which there was no apparent tendency to an increase, because it is only in such that the actions of pyretics can be studied. In all of these the dogs were anæsthetized, and a tracheal tube inserted about an hour before the experiments began. After being placed in the calorimeter, the normal heat production and dissipation were determined for one or two hours, the animal then curarized, and hourly observations made for from three to six consecutive hours.

The heat units represent kilogramme degrees, and the thermometric records are in the Centigrade scale.

In studying these records it is necessary to keep in mind the continual and uncertain variations in heat production and heat dissipation which occur in normal animals; also the tendency to a decline in heat production, heat dissipation, and bodily temperature when animals are confined within the calorimeter for successive hours. Composite curves, made from the results of eight experiments on normal animals (*University Medical Magazine*, April, 1890), which were studied for six successive hours, show that both heat production and heat dissipation are progressively diminished throughout the entire periods of observation, the most marked effects occurring the first hours (see Fig. 1). Excepting during the sixth hour, more heat is dissipated than produced, hence a continual fall of temperature occurs during the first five hours.

Should we construct similar composite curves from the results of the experiments with curare (see Fig. 2), it will be observed that heat production during the first hour is diminished slightly more than in normal animals, and that after this production returns to the normal, and remains remarkably constant during the subsequent hours. Heat dissipation, however, is in excess of the normal during the first and second hours, especially during the former, and during the third and fourth hours is below normal. Hence the temperature falls during the first hour from diminished production and increased heat dissipation, during the second hour from the continued increase of dissipation, during the third hour from diminished production, and during the fourth hour the temperature rises, owing to diminished dissipation. The chief and only important differences between these curves and those of normal experiments are: The increase above the normal of heat dissipation during the first and second hours, the slightly greater decrease in heat production during the first hour, and the almost normal heat production during the subsequent hours.

A critical study of the individual experiments will show that curare in such doses will cause essentially two classes of results which are to be distinguished on the one hand by no specific effect on heat production, and on the other by a decided diminution during the first hour after the injection. Thus, in Experiments 49, 50, 51, and 52 it is evident that there was no specific effect on heat production, yet heat dissipation, as a rule, was decidedly increased, and a fall of temperature occurs from this action. The results of Experiments 53 and 54 illustrate instances of the second class, in which, during the first hour, heat production is diminished decidedly, and in which, during the subsequent hours, the records do not materially differ from those of the first class. These experiments have been largely repeated, and always with concordant results,—either there would be no effect on heat production, as in the first set of experiments, or a notable decrease dur-

the first hour. In the latter class the fall of temperature is always more decided.

It is important to note that even though the curarized condition is maintained by sufficiently repeated injections of curare, the subsequent doses do not by any means reproduce the effects of the first. This is strikingly illustrated in Experiments 53 and 54.

THIRD SERIES.—*The Actions on Heat Production and Heat Dissipation.*

Experiment 49.—Dog; weight, 8.617 kilos.

	Hourly heat production.	Hourly heat dissipation.	Rectal temperature.			Mean room temperature.
			Beginning of hour.	Ending of hour.	Gain or loss (+ or —).	
First hour before curare	27.965	27.000	38.50°	38.64°	+ 0.14°	22.2°
Second hour before curare	28.309	27.000	38.64°	38.83°	+ 0.19°	23.0°
*First hour after curare	27 919	32.400	38.83°	38.18°	— 0.65°	23.2°
Second hour after curare	28.605	31.500	38.18°	37.76°	— 0.42°	23.4°
Third hour after curare	31.550	27 000	37.76°	38.42°	+ 0.66°	22.5°
Fourth hour after curare	28.440	25.200	38.42°	38.89°	+ 0.47°	22.7°

Experiment 50.—Dog; weight, 11.11 kilos.

First hour before curare	33.867	36.000	39.77°	39.53°	— 0 24°	21.1°
*First hour after curare	34.536	37.800	39.53°	39.12°	— 0.41°	22 0°
Second hour after curare	30.368	35.200	39.12°	38.58°	— 0.54°	22.5°
Third hour after curare	29.036	32.400	38 58°	38.17°	— 0.41°	23.2°

Experiment 51.—Dog; weight, 7.712 kilos.

First hour before curare	16.674	17.414	38.25°	38.35°	— 0.12°	20.2°
*First hour after curare	15.147	20.700	38.35°	37.45°	— 0 90°	20.7°
*Second hour after curare	18.823	21.600	37.45°	37.00°	— 0.45°	20.8°
Third hour after curare	16.432	18.900	37.00°	36 60°	— 0.40°	21.0°
*Fourth hour after curare	17.768	15.300	36.60°	37.00°	+ 0.40°	20.8°
Fifth hour after curare	17.485	14.400	37.00°	37.50°	+ 0.50°	20.6°

Experiment 52.—Dog; weight, 8.163 kilos.

First hour before curare	25.975	24.212	38.28°	38.55°	+ 0.27°	18.2°
*First hour after curare	24.296	28.806	38.55°	38 12°	— 0.43°	18.4°
*Second hour after curare	25.558	23.403	38.12°	38.45°	+ 0.33°	18 0°
*Third hour after curare	23.490	22.511	38.45°	38.60°	+ 0.15°	18.2°
Fourth hour after curare	24.471	22.512	38.60°	38.90°	+ 0.30°	18.3°
*Fifth hour after curare	25.285	24.306	38.90°	38.75°	— 0.15°	18.7°

Experiment 53.—Dog; weight, 9.297 kilos.

First hour before curare	14.102	14.102	38.90°	38.90°	± 0.00°	21.2°
*First hour after curare	8.644	19.800	38.90°	37.40°	— 1.50°	21.3°
Second hour after curare	13.972	14.000	37.25°	37.20°	— 0.05°	21.2°
*Third hour after curare	14.656	18.003	37.25°	36.80°	— 0.45°	21.0°
Fourth hour after curare	16.242	18.101	36.80°	37.05°	— 0.25°	21.6°
*Fifth hour after curare	11.387	9 900	37.05°	37.25°	+ 0.20°	22.0°

Experiment 54.—Dog; weight, 7.7 kilos.

*First hour before curare	15.355	14.123	39.70°	39.90°	+ 0.20°	19.8°
*First hour after curare	8.784	17.100	39.90°	38.55°	— 1.35°	19.9°
*Second hour after curare	16.128	18.900	38.55°	38.10°	— 0.45°	19.4°
*Third hour after curare	14.010	11.700	38.10°	38.40°	+ 0.30°	19.5°
Fourth hour after curare	14.481	11.709	38 40°	38.85°	+ 0.45°	19.7°
*Fifth hour after curare	15.712	12.632	38.85°	39.35°	+ 0.50°	19.4°

* Curare injected.

FOURTH SERIES.—*The Actions on Heat Production and Heat Dissipation of Cocaine and Caffeine in Curarized Animals.*

Experiment 55.—Dog; weight, 10.884 kilos.

	Hourly heat production.	Hourly heat dissipation.	Rectal temperature.			Mean room temperature.
			Beginning of hour.	Ending of hour.	Gain or loss (+ or —).	
First hour before cocaine	26.212	27.082	39.28°	39.18°	— 0.10°	18.7°
*First hour after cocaine	23.323	28.025	39.18°	38.64°	— 0.54°	19.2°
*Second hour after cocaine	26.163	26.250	38.64°	38.63°	— 0.01°	20 3°
Third hour after cocaine	27.126	27.300	38.63°	38.61°	— 0.02°	21.0°
*Fourth hour after cocaine	28.037	25.600	38.61°	38.89°	+ 0.25°	20.4°
*Fifth hour after cocaine	22.153	25.200	38.89°	38.54°	— 0.35°	20.2°

Experiment 56.—Dog; weight, 8.833 kilos.

First hour before cocaine	21.507	29.675	38.66°	37.95°	— 0 71°	23.4°
First hour after cocaine	26.789	25.800	37.95°	38.09°	+ 0.14°	23.0°
*Second hour after cocaine	23.566	23.425	38.09°	38.11°	+ 0.02°	23.2°
Third hour after cocaine	24.065	23.500	38.11°	38.19°	+ 0 08°	23 5°
Fourth hour after cocaine	32.267	24.000	38.19°	39.36°	+ 1.17°	23.4°

Experiment 57.—Dog; weight, 10.884 kilos.

First hour before cocaine	12.670	27.750	39.55°	37.82°	— 1.73°	20.1°
*First hour after cocaine	21.422	27.175	37.82°	37.16°	— 0.66°	20.6°
Second hour after cocaine	20.326	20.675	37.16°	37.12°	— 0.04°	20.6°
*Third hour after cocaine	21.763	21.850	37.12°	37.11°	— 0.01°	21.3°
Fourth hour after cocaine	20.569	19.000	37.11°	37.29°	+ 0.18°	20.5°

Experiment 58.—Dog; weight, 5.442 kilos.

First hour before cocaine	7.583	10.500	37.95°	37.28°	— 0.67°	22.2°
First hour after cocaine	12.498	13.500	37.28°	37.05°	— 0.23°	22.6°
Second hour after cocaine	13.838	12.750	37 05°	37.30°	+ 0.25°	21.8°
Third hour after cocaine	13.427	11.250	37.30°	37.80°	+ 0.50°	22.0°
Fourth hour after cocaine	11 772	11.250	37 80°	37.92°	+ 0.12°	22.2°

Experiment 59.—Dog; weight, 8.16 kilos.

First hour before cocaine	9.776	16.500	38.70°	37.67°	— 1.03°	19.3°
*First hour after cocaine	13.108	13.500	37.67°	37.61°	— 0.06°	19.7°
Second hour after cocaine	17.872	15.000	37.61°	38.15°	+ 0.44°	19.6°
Third hour after cocaine	15.326	15.000	38.15°	38.20°	+ 0.05°	19.6°
*Fourth hour after cocaine	16.535	14.250	38.20°	38.55°	+ 0.35°	19.8°
Fifth hour after cocaine	17.514	14.250	38.55°	39.00°	+ 0.45°	19 7°

Experiment 60.—Dog; weight, 6 349 kilos.

First hour before caffeine	11.375	9.750	38.45°	38.77°	+ 0.32°	19 9°
*First hour after caffeine	10.906	10.500	38.77°	38.85°	+ 0.08°	20.2°
*Second hour after caffeine	11.758	11.250	38.85°	38.95°	+ 0.10°	20 6°
Third hour after caffeine	12.152	12.000	38.95°	38.98°	+ 0.03°	20 4°
*Fourth hour after caffeine	11.316	13.500	38.98°	38.55°	— 0.43°	20.5°
Fifth hour after caffeine	10 984	12.000	38.55°	38.35°	— 0.20°	20.4°

Experiment 61.—Dog; weight, 8.163 kilos.

First hour before caffeine	5.628	15.750	38.15°	36.60°	— 1.55°	18.4°
First hour after caffeine	18.036	15.750	36.60°	36.95°	+ 0.35°	18.4°
*Second hour after caffeine	20.842	17.250	36.95°	37.50°	+ 0.55°	18.5°
*Third hour after caffeine	20.974	15.750	37.50°	38.30°	+ 0.80°	18.4°
Fourth hour after caffeine	17.756	17.250	38.30°	38.35°	+ 0.05°	18.6°
Fifth hour after caffeine	17.359	14.250	38.35°	38.82°	+ 0.47°	18.6°

* Curare injected.

FOURTH SERIES.—*The Actions on Heat Production and Heat Dissipation of Cocaine and Caffeine in Curarized Animals.*—(Continued.)

Experiment 62.—Dog; weight, 10.884 kilos.

	Hourly heat production.	Hourly heat dissipation.	Rectal temperature.			Mean room temperature.
			Beginning of hour.	Ending of hour.	Gain or loss (+ or —).	
First hour before caffeine	21.312	28.800	38.03°	37.17°	— 0.86°	19.7°
*Second hour before caffeine	21.531	22.750	37.17°	37 03°	— 0.14°	19 8°
First hour after caffeine	18.439	23.750	37.03°	36.42°	— 0.61°	21.7°
Second hour after caffeine	23.514	21.250	36.42°	36.68°	+ 0.26°	21 9°
Third hour after caffeine	20.971	20.100	36.68°	36.78°	— 0.10°	22.2°

* Curare injected.

The fact developed by these experiments, that we may maintain an animal in the curarized state for hours without specifically affecting heat production, excepting, perhaps, during the first hour, is of pre-eminent importance, since we are thus enabled in calorimetrical studies to eliminate muscular movements which may affect the determination of the direct actions of heat-producing agents.

FOURTH SERIES.—*The Actions of Cocaine and Caffeine on Heat Production and Heat Dissipation.*—In the preceding series the results showed that certain pyrexial agents were apparently capable of causing a rise of temperature in curarized animals. This fact led to the performance of a number of experiments to determine in what way the heat processes are affected. In these only cocaine and caffeine were used, because of their having been carefully studied in normal animals, their constant effects, and the remarkable potency of the former to increase heat production and bodily temperature.

In these experiments, in order to avoid a rise in temperature and an increase of heat production by the curare itself, animals were selected in which, after giving the curare, the temperature showed a definite tendency downward. Five experiments were made with cocaine and three with caffeine. The doses

FIG. 1.—*The Curves of Heat Production and Heat Dissipation in Normal Animals.*

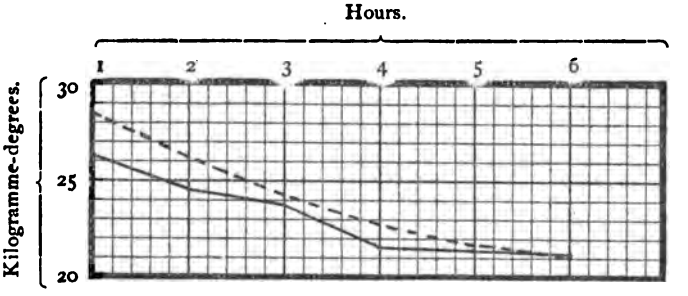
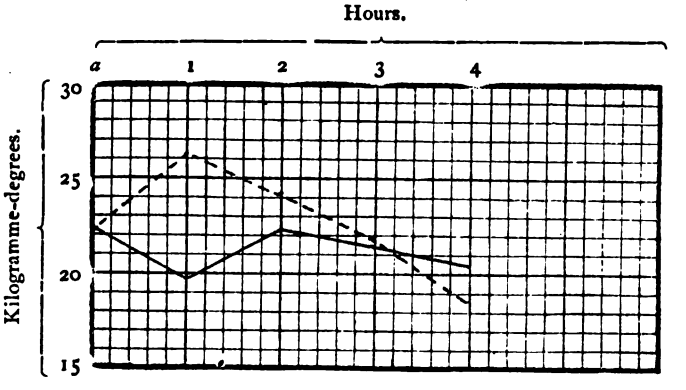


FIG. 2.—*The Actions of Curare on Heat Production and Heat Dissipation.*



were given subcutaneously, the cocaine in doses of .01 gramme to the kilo, and the caffeine .07 gramme to the kilo. The procedures in this series were the same as in the calorimeter. Curare was also injected from time to time, as occasion demanded.

In a study of the actions of cocaine on the heat processes in normal animals (*University*

FIG. 3.—*The Actions of Curare and Cocaine on Heat Production and Heat Dissipation.*

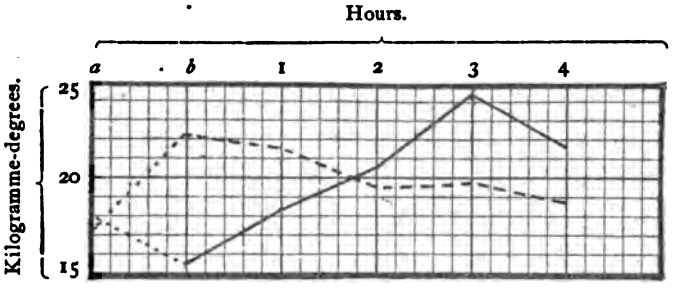
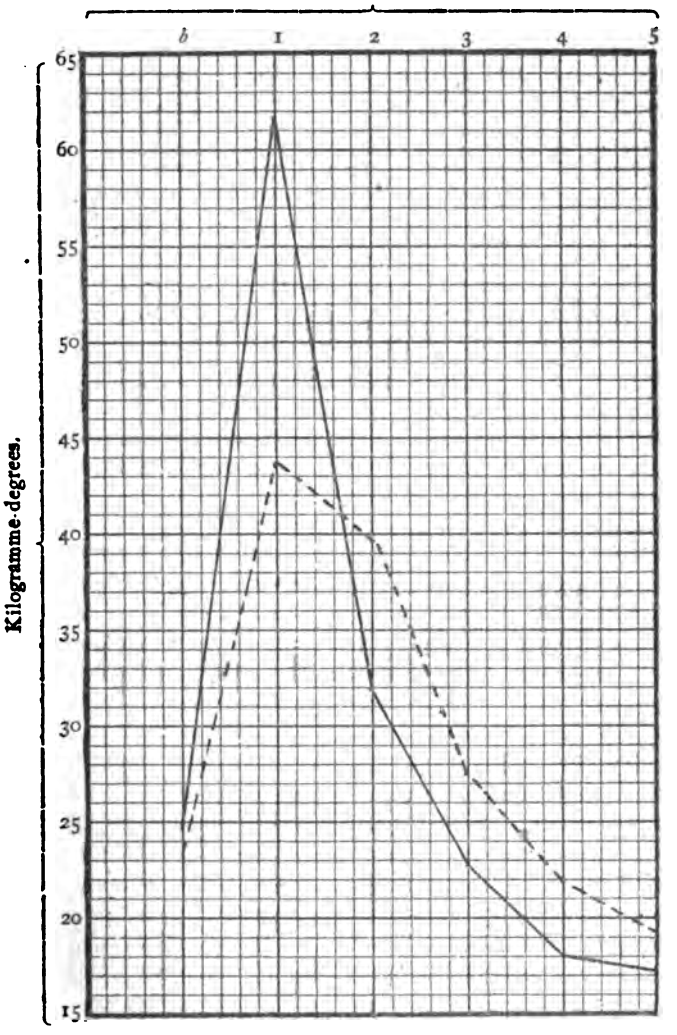


FIG. 4.—*The Actions of Cocaine on Heat Production and Heat Dissipation in Normal Animals.*



preceding, the only difference being the injection of one or the other of these substances before or after placing the animals within the

Medical Magazine, May, 1889), I have found that similar doses will cause an enormous increase of heat production during the

hour after injection, and that during the second hour production is still in excess of the normal, while during the three subsequent hours it is subnormal. Composite curves of these experiments (see Fig. 4) will show that during the first hour the average increase is about two and a half times the normal, and during the second hour about one-third of the normal. The curve of heat dissipation exhibits a marked increase during the first two hours, a slight increase during the third, and a diminution during the fourth and fifth hours.

Composite curves of the records of the experiments with curarized animals in which cocaine was used are of an entirely different character. In these experiments the animals were curarized, and then studied for an hour before the cocaine or caffeine was given. As we do not know what the heat production and heat dissipation were in the normal condition, it is fair to assume that the curves during the first hour under curare were the same as in the experiments of the third series, hence they may be provisionally inscribed on the diagrams. The curves in Fig. 3 represent the mean changes in the heat processes in those experiments of the fourth series in which cocaine was used. In order to appreciate what influence the cocaine may have exerted it is necessary to compare these curves both with those of animals curarized and with those in which the cocaine only was injected.

Comparing first the curves in Figs. 2 and 3, it will be observed that the curves of heat dissipation do not materially differ, while those of heat production differ only after the second hour of the curarized state; in the animals with curare only production shows a downward tendency, while in those with cocaine there is a decided movement upward. When, however, we compare Figs. 3 and 4, the differences are very striking. In the curarized animals the increase of heat production during the first hour after cocaine is not more than the mere return to the normal that occurs in animals simply curarized, while

FIG. 5.—*The Actions of Curare and Caffeine on Heat Production and Heat Dissipation.*

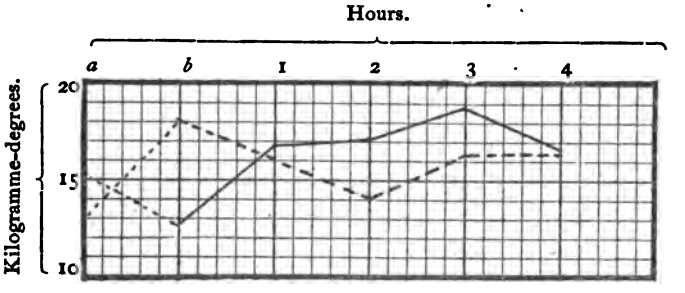
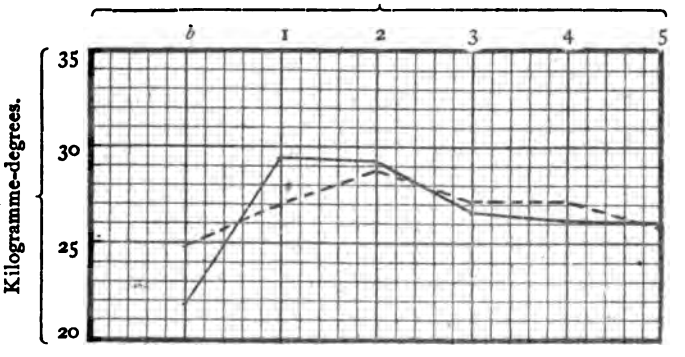


FIG. 6.—*The Actions of Caffeine on Heat Production and Heat Dissipation in Normal Animals.*



Solid lines (———) represent curves of heat production.
Broken lines (– – – –) represent curves of heat dissipation.
Dotted lines (- - - -) represent assumed curves of heat dissipation and production.
The *a* line represents the time of giving curare in the curare experiments, and the normal standards of heat production and heat dissipation.
The *b* line represents the time of giving cocaine or caffeine when these were used.

in normal animals the increase is remarkable. In curarized animals production continues increasing during the two succeeding hours, and reaches a maximum increase of about fifty per cent. during the third hour, and then declines. In the normal animal, however, the climax of heat production is observed during the first hour, and during the third hour is actually subnormal, and also for succeeding hours. The curves of heat dissipation are wholly dissimilar, and in their relations to their respective curves of heat production are directly the opposite, heat dissipation in the curarized animals being in excess of production during the first hour after cocaine and less during the subsequent hours, while in normal animals precisely the reverse is the case. It is thus very evident that curare has prevented the appearance of the characteristic effects of cocaine. The dogs used in Experiments 55 and 59 were studied the following days in the calorimeter without curare, but with the same doses of cocaine. The results were identical with those in normal dogs, thus proving the preventive action of the curare.

A study of the effects of caffeine in curarized and normal animals (Figs. 5 and 6) will show that curare has also prevented the normal actions of caffeine, although not to so marked an extent as with cocaine. In curarized animals, heat production is continually increased during the first three hours, while in normal animals the highest point is attained during the first hour, there being an almost imperceptible decline from this point during the second hour, and during the following hours a gradual falling off. In both sets of experiments heat production remained above normal during the entire periods of observation. The curves of heat dissipation are dissimilar, and their relations to the curves of heat production are different, hence the temperature curves are unlike.

It is thus apparent that curare prevents cocaine from causing its characteristic effects, and that it is inefficient in antagonizing the actions of caffeine, although somewhat modifying the results.

The proper interpretation of these interesting results is, perhaps, a matter of speculation, but there are reasons for believing that cocaine causes an increase of heat production by exciting a thermogenic centre, which is located somewhere above the medulla oblongata, and that curare depresses or paralyzes this centre. The increase of heat production caused by caffeine is doubtless due to an action on some other part of the organism, and which is unaffected by curare in the doses employed.

It is important to note that, while curare prevents the enormous rise of heat production by cocaine, it does not affect the normal output of heat, excepting in those cases in which heat production is diminished during the first hour. It would seem probable from this that curare has paralyzed an accelerator centre, and left intact what may be considered as the automatic heat centre of the body. Caffeine may stimulate this latter centre, or directly excite chemical changes in the heat-producing tissues.

The following summary embraces the chief features of the actions of curare on the heat mechanism :

Doses insufficient to cause motor paralysis may increase the temperature, or primarily increase and secondarily diminish it.

Doses just sufficient to abolish voluntary motion act differently in different animals; the temperature from the first may be increased or decreased, or primarily increased and secondarily diminished, or primarily diminished and secondarily increased. Generally there occurs a notable diminution or a decided increase, the former effect predominating.

Repeated doses may cause a progressive lowering of the temperature, or a progressive rise, until death ensues.

Large doses invariably diminish the temperature, excepting in certain cases where the animal has been under the influence of curare for some time, or when the temperature exhibits a strong tendency to rise.

The increase of temperature is due to an increase of heat production, and the fall to an increase of heat dissipation, which may to a great or little extent be aided by a diminution of heat productlon. Heat dissipation is always increased, but heat production may primarily be increased and secondarily diminished.

After doses just sufficient to abolish voluntary motion, heat dissipation is increased, and this generally is the sole factor in causing the fall of temperature, although during the hour immediately following the injection there may be a transient diminution of heat production to aid in the appearance of this phenomenon.

The variable effects on temperature are owing to the dual action of curare on the processes of production and dissipation ; heat dissipation is always increased, and thus tends to diminish temperature, but heat produc

may coincidently be increased or diminished, and thus antagonize, or even supersede, or aid the effect of increased heat dissipation.

Cocaine is unable to produce its characteristic effects in animals even lightly curarized.

Caffeine is still capable of causing an increase of heat production and temperature, although the effects are somewhat modified.

Curare apparently depresses or paralyzes an accelerator heat centre, leaving intact the automatic heat centre.

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THE PLACE OF MERCURY IN THERAPEUTICS.

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(Continued from page 25.)

II.

CALOMEL IN INFANTILE THERAPEUTICS.

ONE of the most common remedies in infantile diseases in the practice of physicians of a former generation was calomel. It was the custom to give small doses of this mercurial in almost all the inflammatory affections, especially in peritonitis, pleuritis, pneumonia, meningitis, and in gastro-enteritis. Condie is one of the best exponents of this practice, and a glance over his "Practical Treatise on Diseases of Children," first published in 1850 (and once so much studied by some of us who may now reckon ourselves among the older members of the profession), will suffice to show the prominent place assigned to calomel in infantile therapeutics. Take, for instance, the treatment of pneumonia. A ¼ or ½ grain of calomel, with about the same quantity of ipecac, was given every three hours during the acute stage of the disease. Essentially the same treatment, following a purgative dose of calomel, was prescribed in acute peritonitis and in colitis.

In croup, large doses of calomel (2½ to 5 grains) were given every two hours, combined with $\frac{1}{12}$ grain of tartar emetic; this heroic treatment Condie supports by the appeal to eminent authorities. "Of the good effects of calomel in croup," he says, "we have abundant testimony. Given in large doses and at short intervals, it is the remedy upon which many physicians have almost exclusively depended for the cure of the disease; while in somewhat smaller doses, after bleeding, an emetic, and the warm bath, it is strongly recommended by a host of authorities. By some practitioners, calomel is directed in enormous doses, far greater than we should be inclined to prescribe; we nevertheless believe that the good effects of this remedy, in a disease of such rapid progress as croup, can be obtained only from its free administration."

Elsewhere Condie gives the *rationale* of the mode of action of the calomel: "Its tendency (*sic*) is to reduce the laryngo-tracheal inflammation, and thus to counteract the pseudo-membranous exudation."

There is no doubt that a similar reason, rather than considerations of empiricism alone, guided the practitioner of a past generation in the choice of calomel as the remedy *par excellence* in the phlegmasiæ of both infantile and adult life; it was given with the belief that it would act as an antiphlogistic.

Here was a medicine of almost universal applicability. As a considerable part of the patients of a physician's *clientèle* were sufferers from acute diseases, here was a remedy at hand which could strike a powerful blow, and generally in the right direction. If the disease were a fever, there were good authorities who affirmed that in grave cases, even of typhoid, it was a good thing to give calomel till the gums were touched, the pores and emunctories opened, the fever poison neutralized or removed; at any rate, amendment sometimes followed as soon as the system felt the influence of the mercurial. If the disease were of the nature of an acute phlegmasia, calomel *a fortiori* was indicated, to prevent organization and promote absorption of the exudation, if for no other reason. There was no occasion to make a very accurate diagnosis; the juvenile tyro might stand aghast before a disease of unknown proportions and nature, but the calomel treatment was indicated all the same, and it was not an easy matter to go astray. Therapeutics was reduced almost to the simplicity of the time of Molière, when *primum seignare, postea clysterizare, ensuita purgare* comprised the sum of the physician's art.

Was the old belief justified?

Is it our duty to give antiphlogistics in acute inflammatory diseases, and is calomel the proper antiphlogistic?

1. So greatly does the pathology of the present day differ from that of the past; so completely are we now dominated by the *damaged-tissue theory* of inflammation, and by the new views as to the *rôle* of microbes in most inflammatory diseases; so fully are we persuaded of the truth of the modern doc-

trine of the natural evolution and self-limited nature of all acute diseases, and of the necessity of husbanding the vital resources, that the very idea of antiphlogistic treatment belongs almost, along with that of witchcraft, to the superannuated notions of the past; while the true antiphlogistics are recognized to be such means, medical and surgical, as restore the damaged vital properties of the inflammatory *foyer* and of the organism generally, and antagonize and combat microbes and ptomaïnes. From this point of view, the belief of our predecessors was not justified by the facts. They saw patients get well from grave inflammations and from fevers, and they attributed the recovery to the medicines which they had prescribed,—a most unwarrantable *post hoc ergo propter hoc* conclusion. They, in short, ascribed to the bleeding, the antimony, and the calomel the favorable changes which belonged to the natural course of the disease itself.

"Since the day when it was understood that pneumonia might get well without bleeding, physicians asked themselves if the other inflammations, if the acute glandular swellings, might not also get well without mercurial inunctions and the general antiphlogistic regimen. They also demanded whether the acute pericardial, peritoneal, laryngeal cases which had been treated by calomel might not have followed the same evolution without the medicine which had been administered so lavishly." *

2. There seems to be no proof that calomel, when given in minute doses, whether to oppose the formation and organization of plastic exudations, or to stimulate the secernant organs and promote elimination, or to arouse the absorbents to greater activity in removing inflammatory products, ever serves any really good antiphlogistic purpose. It does, doubtless, perturb the nutritive processes and deglobulize the blood; it may even render the blood "aplastic." Whether, however, this be a good thing in an inflammatory disease, and with all the evil that is inflicted on the constitution of the blood, is not proved. Nor can we even invoke the help of the known microbicide properties of the mercurial, for there is no evidence that calomel, when given internally in fractional doses, has any such microbicide action.

It is true that calomel is still much given in meningitis, whether simple or tuberculous, small doses (¼ to 1 grain) being administered every hour or two. It cannot be shown that this treatment has ever done any good. The success which has been claimed for it is doubtless attributable, as Dujardin-Beaumetz remarks, to faulty diagnosis,—*i.e*, it is probable that the meningitis was of syphilitic rather than of tuberculous nature.

Many give calomel in meningitis because they are expected to give something, and, on account of the vomiting, nothing else is likely to stay down. Besides, who shall have the hardihood to gainsay the authorities that have advised it?

CALOMEL AS A PURGATIVE AND GASTRIC SEDATIVE.

Having been all my (medical) life a prescriber of calomel, if I were to sum up from my experience the uses of this mercurial in infantile therapeutics, I would say that calomel has seemed to me to do good,—1, as a gastric sedative; 2, as a purgative.

1. In the acute gastric catarrh of infancy and early childhood, a disease which is characterized by obstinate vomiting, lasting for several days, and is, I believe, often accompanied with hepatic congestion, I have often found small doses of hydrarg. subchloride, the only remedy that was borne by the stomach; and, coincidently with the supervention of free bilious purging, I have generally witnessed rapid amendment. This disease, when occurring in adults, is frequently benefited by the same treatment. The old-time physicians seem to have had unbounded faith in calomel in gastro-intestinal disease complicated with hepatic derangement. My former colleague and friend, Dr. Enoch Cross, who had for the last forty years of his life a "malarial liver," and who was subject to attacks of hepatic congestion with irritable stomach, used to resort to small doses of calomel whenever he felt one of his attacks coming on. There was nothing, he declared, which so speedily settled his stomach. He, besides, felt sure that the calomel had a real cholagogue action, and diminished the hepatic engorgement.

In acute indigestion (*embarras gastrique*) I have at times vainly tried to allay vomiting and move the bowels by other remedies, and have often been obliged to resort to calomel eventually, even if I avoided it at the beginning.

In cholera infantum, with constant vomiting and frequent watery stools, I have known minute doses ($\frac{1}{10}$ grain) of calomel, rubbed up with prepared chalk, to be well borne by t'

* Hallopeau, "Du Mercure," p. 186.

stomach and apparently to stay vomiting. Yet calomel is not a remedy on which I would much rely, and I place much more confidence in small pieces of ice, brandy, ice-cold applications if the fever be intense, pancreatized milk, starch and laudanum injections, etc.

If we seek an explanation of the sedation which so often follows the use of calomel in gastric derangements, we may assume that this is due (*a*) to an anæsthetic influence of the mercurial on the nerve-endings; (*b*) to an antiseptic action. Antiseptics in the stomach "prevent decomposition, and by thus lessening the production of irritating products, they diminish irritation of the stomach and arrest vomiting" (Lauder Brunton). Brunton thinks that it is probably to its antiseptic action that corrosive sublimate owes its curative power in cases of infantile dysentery, "and it is not improbable that the beneficial action of calomel is due to a similar action, for it has been found by Wassilieff greatly to retard the decomposition due to low organisms." *

2. Calomel will always remain one of the safest and most efficient purgatives. Clinical experience proves it to be a cholagogue, producing copious bilious stools; it also increases the secretions of the small intestines and promotes peristalsis. The smallness of its dose (1 to 10 grains), its tastelessness, the readiness with which it is tolerated by the stomach, make calomel one of the best cathartics in children's diseases, but it is equally indispensable in the therapeutics of adult life. When mercury acts as a cathartic, but a minimum quantity is absorbed, the greater part being eliminated with the stools, hence the objection which has been so often raised against the mercurial preparations when given for their constitutional effect *that they poison the blood* is hardly applicable to the full cathartic dose of calomel, which may be regarded as harmless as any other purgative.

GENERAL CONSIDERATIONS ON THE PURGATIVE ACTION OF CALOMEL.

The faith of very many excellent practitioners in the derivative power of purging in some inflammations—especially in those of the encephalon—is so great that it is almost a matter of routine to begin treatment by a 5-grain dose of calomel. In inflammations of the brain, calomel is often given *largo manu* with antiphlogistic intent; it is a forlorn possibility on which some hope is made to hang. He would be a hardy man who, when called to a case of apoplexy,—resisting the demands of the family that something should be done,—would refuse to put a few grains of calomel on the patient's tongue. Of course, much more may be expected of the calomel purge in intestinal inflammations. Here the calomel acts both as an antiseptic and a cathartic, and clears the bowels of foul, fermenting residua, and of microbes and ptomaïnes. It must be borne in mind that enteritis and colitis are largely microbe-diseases, aggravated, if not in every case caused, by irritating microbes and their ptomaïnes, and that restoration goes on *pari passu* with the success of attempts to render the intestinal canal antiseptically healthy. Dujardin-Beaumetz, in a late work,† calls attention to the fact that the new researches on the putrid fermentations of the intestines harmonize with and justify the traditional medication of our fathers. "Substitute, in fact, for the words *peccant humors*, *atro biliary* humors, the words *micro-organisms*, *alkaloids of putrefaction*, and you will understand the importance which the physician of the olden times attached to this group of medicaments, and you will better appreciate the language of the physicians of Molière's time, whose very phraseology the immortal comedian has transmitted to us in his 'Malade Imaginaire.' It was not, then, to expedite from the system the bad humors of M. Orgon that Fleurant employed the numerous apozemes prescribed by Purgon, but really in modern language to expel the putrid elements which had developed there."

The superiority of calomel over many other purgative medicines in such cases may be largely due, as Brunton suggests, to the fact that its antiseptic power is not as greatly diminished by admixture with fæcal matters as that of the other antiseptics.

Ives (Prize Essay, New Haven, 1866), who rules mercury out of therapeutics almost altogether, allows it a humble place as a cathartic "when torpor of the colon is presumed."

In dysentery, I have frequently witnessed marked improvement following a purgative dose of calomel; the stools for the time were more fæcal in character, the tormina and tenesmus were lessened. The routine treatment of acute dysentery adopted by some physicians, who give a calomel purge every

* "The beneficial action of mercurials in such cases may be partly due to their antiseptic power not being as greatly diminished by admixture with fæcal matters as that of other antiseptics" (Brunton).

† "New Medications," second edition, 1890, p. 96.

day till bilious, fæcal stools appear, is attended with good results; and, in fact, the frequent exhibition of mild purgatives in this disease till slime and blood disappear from the dejecta, and these have a more healthy color and consistence, seems to be the only rational and successful treatment. I have myself relied chiefly on castor oil or Epsom salts, only beginning the treatment with calomel. A favorite prescription with me in dysentery is castor oil one ounce, laudanum twenty drops, every second morning.

In chronic enteritis, the occasional administration of a calomel purge has proved of great benefit, and the chronic diarrhœa of adults, independent of serious organic change, with watery, pale stools, often yields, according to Ringer, to $\frac{1}{100}$ grain of corrosive sublimate every two or three hours.

In typhoid fever, a favorite plan of treatment, in the initial stages, with some practitioners, is to give, every other day during the first week, 7½ grains of calomel; if the temperature be high, this dose may be given every day. Liebermeister gives three or four ½-gramme doses during the first twenty-four hours of the treatment. "The diarrhœa at first increases, but soon subsides, and is afterwards less troublesome. In most, but not in all cases, the first doses are reported to have been followed by a distinct but transient lowering of the temperature."* The intent of practitioners who give calomel in these doses at the onset of typhoid fever is to obtain its full antiseptic action on the small intestine, to remove irritant fæcal matters, and especially to antagonize the specific microbes and their products.

It is difficult to decide whether or not any real benefit is obtained from calomel thus administered in the early stages of typhoid. To properly carry out this treatment, the patient ought to be seen from the first, which is not always possible, especially in private practice.

It should be mentioned that this mercurial treatment has been condemned by good authorities, as Dr. James Jackson and Dr. Nathan Smith; the latter says that he has seen very serious evils arise from it, and he recommends that the medicine shall be only occasionally used, and with opium, for the purpose of checking a colliquative diarrhœa.†

Yellow Fever; Bilious Remittent Fever.—Calomel is no longer prescribed in yellow fever in the small doses in which it was formerly administered, and, at most, a purgative dose early in the course of the disease is allowed (Corre, Stillé, Robert Jackson).

In bilious remittent fever, most authorities acquiesce in the conclusions formulated by Duncan: "I am of opinion that an endeavor to induce mercurial influence in remittent fever is erroneous in theory and of no value in practice." "If it be true," adds Stillé, "that prostration of vital actions and a deteriorated condition of the blood are pathological states to be much dreaded in remittent fever, and if mercury deteriorates the blood and favors prostration, on what principle of reasoning can it be supposed that induced mercurial influence can have any other than an injurious effect in remittent fever?" ‡

In the acute hepatitis of hot climates, the use of calomel has gone out of vogue, at least its administration, with a view to its constitutional action. "The repeated use of this medicine," says Stillé, "is known to induce a permanent derangement of the hepatic function, with disordered digestion and impaired general health." In chronic hepatitis, with induration of the liver and scanty secretion, mercury is sure to aggravate the lesions, and in cirrhosis it is worse than useless.

Mercury as an Alterative.—There is no doubt that mercurials (calomel, corrosive sublimate, protiodide) have been often prescribed as alteratives for very fanciful reasons; and when I see a popular text-book on gynæcology recommend the treatment of chronic metritis, and even ovaritis and salpingitis, by small doses of bichloride given for months, and when I see standard authorities on skin-diseases advise the same constitutional treatment for eczema, psoriasis, lupus, acne, and almost every chronic cutaneous affection, it is time fearlessly to assert that there is no scientific warrant for this profoundly anæmiating and debilitating medication.

CALOMEL IN FUNCTIONAL HEPATIC DERANGEMENTS.

It is hard to separate the functional disorders of the liver from acute indigestion and its sequelæ. Much of what has passed for *biliousness* would now be regarded as ptomaïne-poisoning, or the liver has been overworked and disabled in consequence of a surfeit.

The observations made by Beaumont more than fifty years ago on Alexis St. Martin

* James C. Wilson, "A Treatise on Continued Fevers." New York, 1881.

† Quoted by Stillé.

‡ "Therapeutics and Materia Medica," vol. ii. p. 703.

must still be cited (as they have recently been by Lauder Brunton)* in explanation of the phenomena of acute biliousness. After excesses in eating and drinking, Beaumont found St. Martin's stomach covered with livid spots and aphthous patches; the gastric secretions were mixed with ropy mucus; the digestion was slower than usual or suspended altogether. A little later the symptoms of biliousness were superadded. The usual appetite was gone; the tongue was covered with a thin yellowish coat. The countenance was sallow, and in the interior of the stomach were several deep-red patches. A muslin bag which had been introduced, with some food in it, in order to test the rapidity of digestion, when drawn out was covered with a coat of mucus and yellow bile. On the succeeding day, the coats of the stomach were still unhealthy, and of a deeper red than naturally, with patches of a still deeper color, and the mucous membrane abraded in places. This venous congestion indicated stasis in the radicles of the portal vein, and hepatic engorgement. Beaumont, who records several such instances in his book (pages 100, 118, 251, 270), states the benefit which, in one instance, was derived from a purgative dose of calomel, "which removed all the foregoing symptoms and the diseased appearance of the inner coat of the stomach." On another occasion, his patient was restricted from a full and confined to a low diet, and simple diluent drinks, with restoration *ad integrum* of the disordered viscera, and return of health and appetite.†

It will be seen that all this has been anticipated in a preceding paragraph (*vide* heading "Gastric Sedatives"). Between the hepatic functions and the gastro-intestinal there is a solidarity such that the derangements of neither can be intelligently discussed separately.

Although the bile acids themselves are sufficiently toxic when in excess in the circulation (see experiments of Harley, Feltz and Ritter, Graham, Brown, and others), and although it has been proved that these acids in jaundice have a speedily depressant effect on the nervous centres, being, indeed, violent cerebral poisons, yet *biliousness* in its common acceptation is a vague and indefinite compound of cholæmia, lithæmia, and stercoræmia; and, as factors in the causation of the morbid syndrome, we have mal-elaborated peptones and poisonous ptomaïnes. In this condition, the relief obtained by free bilious evacuations is most marked, but there is no evidence as to the superiority of calomel, or the old-fashioned blue pill, over purgatives (podophyllin, euonymin, Glauber salts, etc.) which, according to modern researches, are more specially cholagogue.

There is one evil attending the frequent use of calomel, taken "to regulate the liver," which I have noticed. It becomes after a time as much a necessity as the morning "pick-me-up" to the confirmed inebriate. "The frequent use of mercurials," says Budd [in functional hepatic complaints], "may lead to much mischief. When the liver has become accustomed to the stimulus of mercury, no other medicine will sufficiently excite its action. The person is thus led to the habitual use of the medicine, and after a time the constitution is undermined by it. It increases the activity of the liver at first, but seems to leave it weaker than before, and, if frequently resorted to, the nutrition of the patient, impaired by the original disease, is still further impaired by the drug."

In all such cases we should be content with milder medicines which increase the secretion of the liver without having any permanent deleterious effect on the system.‡

Chambers, who prefers the *pil aloes et myrrhæ* as an alterative to any mercurial, uses this emphatic language in his work on "Indigestions," page 49:

"I am particular in enlarging upon this point from the fear lest any language of mine should be construed as an encouragement to an unfortunate tendency towards commencing treatment habitually with destructive remedies. Some call this clearing the decks for action; in a majority of instances they may be said to throw overboard much of the best tackling on the ship and loosen her armor-plates. A so-called sluggishness of the liver is a frequent pretext. In a half-nourished person (and all invalids are but half nourished) the fæces are apt to be light-colored and scanty. Blue pill gives them immediately a darker hue and increases their quantity, but sadly at the cost of the patient's strength, while the temporary change soon passes off. But let the experimenter

* "Disorders of Digestion; their Consequences and Treatment." London, 1886, p. 27.

† Beaumont, "Physiology of Digestion." Burlington, Vt., 1846.

‡ Budd, "On Diseases of the Liver," American edition, 1846.

try meat and iron, and see if he cannot produce the same result."

In jaundice, due to impediment to the outflow of bile, cholagogue doses of calomel can do no good. In that produced by a congested state of the liver, there can be no objection to a calomel purge at the onset, but the general treatment by saline purgatives, alkalies, dieting, and rest will alone give satisfactory results.

MERCURIALS AS EXTERNAL ANTISEPTICS.

The utility of various mercurial preparations as local applications in certain skin-diseases, and as a part of the paraphernalia of antiseptic medicine, surgery, and obstetrics, is beyond all question. Mercury is *par excellence* the parasiticide, whether the pest be vermin, vermes, or microbes. Corrosive sublimate is unquestionably the best antiseptic and the most generally useful of these preparations. It is because mercury is such a foe to living matter that it is a good antiparasitic remedy, but it is, for the same reason, an internal medicament which must be given with caution.

But it is not my intention to pursue this topic, my object having been to discuss the uses of mercury in its application to internal medicine; and I shall briefly sum up what I have written in this and the preceding article:

1. Mercury must still take the palm over all other remedies in the treatment of secondary syphilis. Here the choice is between two evils; but the syphilitic poison is a greater blood-spoiler than mercury when judiciously administered; and, in antagonizing and destroying the virus of syphilis and preventing its ravages on the blood, mercury becomes a genuine reconstituent tonic. The mercurial treatment is not to be commenced *till the syphilis has declared itself*, and is to be instituted only in the secondary stage.

2. Mercury (under the form of calomel) has no place in medicine as an antiphlogistic or alterative, and its employment in fractional doses, in combating inflammations, whether acute or chronic, should be absolutely discarded.

3. Calomel has a limited usefulness in infantile therapeutics, but principally as a gastric sedative and as a thorough antiseptic cathartic.

4. Calomel is an efficient purgative, stimulating the secretions of the intestines and liver, and promoting intestinal peristalsis; it remains so long unchanged in the alimentary canal that it exercises a local antiseptic and sedative effect, and hence proves valuable in many morbid states of that canal. As a cathartic, it is good to clear the *primæ viæ*, especially when no other cathartic can be borne, owing to irritability of the stomach; in the onset of some inflammatory or febrile diseases it may have a useful depurative and even derivative effect.

5. In ordinary "bilious" complaints calomel has a place which is entirely subordinate to other more rational and hygienic modes of treatment.

IODOFORM IN CHRONIC EYE CONDITIONS.

By G. Walter Barr, M.D., Keokuk, Iowa.*

THE use of iodoform as a dry antiseptic dressing has always had a tendency, in my hands, to produce exuberant granulations. This suggested the use of the same substance in cases where it is desired to stimulate cell-growth, and naturally some chronic conditions of the eye offered an attractive field for investigation.

It seemed evident that to attain antisepsis and the stimulating effect of the drug, seen in open wounds, it must be continually kept in contact with the part; this ruled out of the question the almost discarded use of iodoform pencils as rapid, repeated applications; the pure iodoform is much too irritating for use in the eye; and an ointment of proper strength best fulfils the conditions. The strength of the ointment should vary with the amount of stimulation desired and the susceptibility of the eye, for there is an individual factor of susceptibility which is far from constant. From 1 to 5 grains of iodoform to the ounce of vaseline has been found most often of greatest use. *En passant*, it is hard to find vaseline now which is free from some irritating substance (probably acid) left in it in the process of refining. This applies to unguentum petrolei, under whatever trade-marked name it is sold.

The first case in which I used the iodoform ointment was a girl aged 15, who had barely light perception in one eye and an anterior staphyloma in the other. There had been conjunctivitis from infancy, and the entire cornea was opaque in the eye which did not have the staphyloma. Before operating on the latter, it was highly desirable to get the best possible vision in the other eye. The

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ordinary practice had been exhausted, and a 4-grain iodoform ointment was placed in the eye three times a day. In a fortnight the vision was perceptibly improved, and in three months she could count fingers. This eye never got much better, perhaps partly due to a pathological condition of the optic nerve from a long disuse,—from early infancy,—although the cornea became gradually clearer. The staphyloma was operated upon, leaving a triangular piece of cornea, about 1.5 millimetres in dimensions on each side, and an iridectomy performed behind it. The corneal remnant at once became opaque in the process of healing; there was total blindness in the eye. A 4-grain iodoform ointment was applied twice a day, sufficient being placed on the everted upper lid to last until the next application. In three months the corneal remnant had so cleared up that she could recognize faces in her limited field of vision. I have never had any but the most gratifying results in treating pannus, however deeply the cornea is affected, by the use of iodoform ointment; the sight has not always been completely restored in the worst cases, but vision has been doubled or improved even more. The length of the period of treatment seems to be in direct ratio to the age of the pannus, but several months are nearly always required in cases of long standing. The ointment should be applied often enough to keep the cornea constantly covered with it.

In trachoma, the efficacy of iodoform ointment depends on the amount of stimulation required and the strength of the ointment. By varying the strength of the ointment, it seems to me that greater nicety of effect can be obtained than in any other way. Trachoma of years' standing with large granulations, which are best adapted to the compression treatment, quickly succumbs to a 4-grain ointment, applied twice a day. In trachoma and chronic conjunctivitis the iodoform ointment may be used to advantage in conjunction with other treatment, where stimulation is not contraindicated, by applying it at bedtime; the result is a cessation of the gummy or pustulating condition of the lids in the morning.

In indolent ulcers, the results have been as encouraging as in pannus. Sometimes it has been necessary to touch the ulcer with cupric sulphate, but in two cases nothing but the ointment was necessary. In all the ulcer healed much more rapidly when the iodoform ointment was used, and usually without cicatricial cloudiness. Continued use of the ointment soon removed all marks of the ulcer and left the cornea perfectly clear.

The above is a generalization of the results in over a hundred cases of trachoma (mostly of very long standing), thirty cases of pannus, and a dozen cases of corneal ulcer. They seem to me to justify a further trial by others. The points to be remembered are, that much depends on a proper strength of ointment in each case, and that it is not adapted to acute conditions.

Regarding the *modus operandi*, those who are not confirmed microbmaniacs will attribute the action to the cell stimulation seen in the use of iodoform in chronic ulcers and like conditions. Of course, in trachoma and chronic conjunctivitis, something may be due to the antiseptic action of the iodoform, but hardly in pannus, or, perhaps, in corneal ulcer.

STANDARDIZED VEGETABLE DRUGS AND GALENICAL PREPARATIONS.

A QUESTION OF THE DAY.*

By F. E. Stewart, M.D., Ph.G., Wilmington, Del.

I TAKE it for granted that I am addressing an audience whose desire is to find out the actual merits of the important subject forming the title of this paper. I also take it for granted that you are all good and patriotic citizens, and therefore care more for the interests of humanity, as represented by the people of the United States, than you do for your personal interests from a purely selfish point of view. As true professional men, engaged in practising medicine or preparing the same, your allegiance is to the cause of suffering humanity, and you will and do make all other causes secondary thereto. But, even from a selfish point of view, the physician must seek first the interest of his patient, and select such medicines as shall promptly act as remedies in the case, for only by so doing is reputation secured and that monetary reward which results from an increased public patronage. The same remark can be applied to the pharmacist, for it is the long-headed pharmacist who, from a selfish point of view, seeks to gain reputation and increased trade by serving the public with the very best that the market can afford. There is a narrow selfishness, however, exercised by a narrow man, whether he be a pharmacist or a "don't-care

* Read before the Medical and Surgical Society of Maryland.

doctor," who, looking for money only, employs the cheapest product that the market affords, the only question with him being the cost and the selling price. This is a very short-sighted policy, but it is unfortunately found, however, in the unprofessional, uneducated, and unthinking physician, and in the case of the druggist who sees in his vocation no responsibility and nothing but an opportunity for gold.

I do not suppose for one moment that I am addressing an audience which contains a single person of the kind that I allude to.

It is my purpose, therefore, to present this subject from a broader point of view, in the light that I see it as a physician and graduate in pharmacy, and as a teacher both in medical and pharmaceutical schools. I recognize, however, that I am addressing an audience of my peers, and I have no doubt that some in this room may see the subject in a very different light than I do. I hope such will not hesitate to express their views in the discussion which, I presume, will follow the reading of my paper. I am here to learn, as well as to give you my own ideas, and it may be that we will all modify our own views by a frank exchange of opinion.

The standardization of vegetable drugs and Galenical preparations has become one of the leading questions of the day. This question is being argued from all points of view. Some are arguing from the broad platform of professional character, others from the narrow platform of selfishness. Let us to-night weigh these arguments for what they are worth, and consider the motives of those who offer them.

First.—What is meant by standardizing vegetable drugs and Galenical preparations? It is to assay them chemically, so that physicians may have placed in their hands preparations of vegetable drugs which, instead of varying greatly in strength as at present, shall conform to a fixed and definite standard. It is proposed that tincture of nux vomica, for example, shall conform to a certain standard of strength, and not be made of one strength to-day and another strength to-morrow; for it is a fact now that a physician never knows what strength is furnished his patients, and therefore is uncertain regarding the effect of medication.

Because opium varies in morphine from 2.48 per cent. in samples of the drug from East India, to 22.88 per cent. in a fine quality of French opium, the Committee for Revising the United States Pharmacopœia deemed it best to publish a method of assay in the Pharmacopœia, whereby opium can be assayed and standardized preparations made therefrom. Because cinchona varies in alkaloidal strength from 1 3 5 per cent. in some specimens down to less than one per cent., the committee, in a subsequent revision, inserted a process in the Pharmacopœia whereby cinchona can be assayed and the preparations made from it can be standardized to a certain strength. Now, as belladonna-leaves vary in alkaloidal strength from .010 to .050 per cent., and the root from .25 to .60 per cent., and nux vomica contains from one-fourth to one-half per cent. of strychnine, the friends of standardization, seeing how well it works in the cases of opium and cinchona, ask to have it extended to belladonna and nux vomica.

But there suddenly appears an opposition to any further extension of standardization. The opponents say that the scheme is impractical and injurious; that its adoption will ruin the retail drug trade of this country, by raising the standard of the Pharmacopœia above the ordinary pharmaceutical ability, and throw the manufacture of Galenical preparations into the hands of the large manufacturing houses, etc.

Let us take up these arguments one by one and examine them. First, Has the adoption of standards for opium and cinchona in the Pharmacopœia raised the standard of this work above ordinary pharmaceutical ability, and vested the manufacture of opium and cinchona preparations in the hands of the manufacturing houses to the injury of the retail drug trade? If it has not done so, is there any reason to suppose that the extension of standardization to belladonna and nux vomica will effect the manufacture of preparations from these drugs any differently? If not, where is the line to be drawn where standardization will commence to have such baneful influence on the retail drug trade?

But suppose, for example, that the adoption of standards for every drug containing characteristic active principles in sufficient amount to admit of assay were introduced into the United States Pharmacopœia, and the result was to throw the manufacture of Galenical preparations into the hands of the larger manufacturing houses, thus taking it away from the retail druggists, how could anybody be so cruel and selfish as to ask that the cause of suffering humanity should be sacrificed to benefit the retail trade? Even if an attempt were made in such a ca

to block the wheels of progress that the retail drug trade should profit by the suffering of their fellow-man, how long would the block stand? It would be like the wall of sand the children erect on the beach to block ocean's rising tide. No, I will not do an injustice to the retail drug trade of this country by leaving my argument in a form where it may be said that I charge such selfishness to the retail druggists. I believe that I say truly when I claim that the retail druggists, as a class, are above such a level as this.

Yet I heard an argument one time by a pharmacist that makes it appear that there are those who would be guilty of the very act I refer to. This gentleman said that he was in favor of standardized drugs, but not in favor of standardized Galenicals. In other words, he will not oppose a plan whereby the wholesale druggist shall be required to sell drugs of standard strength, but he will oppose a plan whereby the retailer is forced to test the accuracy of his manipulations applied to the same drug in its manufacture by assaying the finished preparation of it. If the retailer buys opium, cinchona, belladonna, and nux vomica of standard strength to commence with, it is enough; and he should not be required to furnish any guarantee that he has extracted the activities of the drug by testing his finished preparation. Surely any one who has had much experience in manufacturing knows that failures in this connection are not an uncommon thing. The only way to be certain that a preparation is up to the standard is to assay it; for, no matter how carefully a drug has been assayed, its strength may deteriorate, unless great care is taken to store in sealed packages and keep at a uniform temperature; or careless manipulation may result in failure to extract all its virtues.

Now, I do not wish to argue against druggists purchasing standardized drugs. What I do say is, that the only sure way is to purchase standardized drugs in the first place, and standardized finished preparations afterwards. In case the latter test alone was relied upon, druggists would be the losers frequently, for they would often pay first-class prices for weak drugs, and thus be out of pocket in the end on account of the larger amount required to bring the preparations made from them up to the standard.

What the gentleman referred to is afraid of is that the retailer who attempts to standardize his Galenical preparations cannot compete with the manufacturing houses, and he is willing to sacrifice the cause of suffering humanity for the retail druggist. But I think this difficulty is more apparent than real, for the preparations admitting of such tests are, as a rule, from narcotic drugs which are sold only in comparatively small quantities, and their dispensing is limited almost exclusively to physicians' prescriptions, so that the expense of assay would make but little difference in the cost; while, on the other hand, the increased prescription trade resulting to druggists adopting such improved methods would more than make up the difference.

And in this connection another thing must be considered, and that is the following: Much of the drug business of the past has unfortunately consisted in selling patent medicines, soda water, and fancy goods. This business is rapidly drifting away from the retail drug-store, and will continue to drift, in spite of all means taken to prevent it. Furthermore, this kind of business is not the practice of the profession of pharmacy. It is not for this that pharmacists spend years of study and graduate in pharmacy. For a merchant service of this kind a business college is far better training than a college of pharmacy. Now, I believe that any plan which elevates the practice of pharmacy above that of a petty shopkeeper to the true dignity of a liberal and educated scientific profession should be encouraged. This standardization has a tendency to do, for it raises the standard of pharmaceutical practice to a much higher level.

My argument is in behalf of the retail druggist in his true vocation of scientific pharmacist and member of a branch of service which must be regarded as a medical specialty, and which should rate him as the equal of the physician in every respect, provided his education has been equally liberal and comprehensive.

Now, suppose the pharmacist prefers to buy Galenical preparations rather than to make his own, then what is the state of the case?

Of course in this case he should test the Galenical preparations he buys. But the opponents of standardization say that this he will not do, and this he cannot do.

In regard to his will not do, this is a question that each individual must settle for himself. He buys his inorganic chemicals on faith from the manufacturer, and no one charges him with foolishness. Will any one say that the manufacturers of inorganic chemicals are more honest than those who

manufacture preparations of drugs belonging to the vegetable kingdom.

In regard to his incompetence I have evidence to prove that the retailer who is not already competent can make himself so without great expenditure of time and money.

Surgeon Mew is the government chemist, employed by the United States army for assaying the drugs and preparations used by the medical department of this branch of the national service. He has been engaged in his vocation for seventeen years. During that time his experience has been very great. While attending the Convention for Revising the United States Pharmacopœia in May as a delegate from the Medical Society of Delaware, I called on Dr. Mew to ascertain the amount of apparatus and knowledge necessary to test Galenical preparations. I found Dr. Mew busily engaged in his laboratory, situated in the Army Medical Museum, and the following is what he told:

"In the first place," said Dr. Mew, "the apparatus required for this work is neither extensive or expensive. You see how simple it is, for it is all before you. In the second place, the knowledge required is not difficult, nor does the manipulation require special skill. Much of my work is done by a soldier that I have trained for the purpose, and I will guarantee to teach any person of ordinary pharmaceutical ability to do the work well in six months. As to the practicability of carrying on such a work, my experience is sufficient proof. I have been engaged in it for seventeen years, and we test here every Galenical preparation containing principles that can be recognized and existing in sufficient quantities to admit of assay. Often the medical purveyor changes the mark, and sends back the same preparation again and again to test the accuracy of our results; and the trial only proves that our results can be relied upon. As to the necessity of assay, you will not doubt it when I tell you that preparations made by the best houses in the country are sent to us absolutely devoid of activity. Such cases prove that the most conscientious manufacturer, who carefully selects his drugs and uses the most approved method for preparing it, cannot depend on his results, owing to the varying amount of activity present in medicinal plants, owing to soil, climate, and season of the year when gathered."

In response to the question, How would you detect the fraud if some cheaper alkaloid were put in as an adulterant in place of a more expensive one? Does not Mayer's reagent throw down one as well as the other? he said, "I always test my precipitate for identity. Any chemist would do that. But I have yet to find a single instance where such a fraud has been attempted."

A great deal more could be said along this line, but I have already taken up much of your valuable time. There is one point, however, that I wish to cover, which is very important, and which you should thoroughly consider. It is this: There are two classes of persons opposed to standardizing vegetable drugs and Galenical preparations. The first class argue against it from the purest of motives. Some of this class are gentlemen of a great deal more knowledge and ability than I possess. These gentlemen are chemists of high repute. Some of them consider the whole scheme of standardization impractical and visionary. To such I wish to say that until they can upset the following evidence, I shall remain on the side of those who believe in it. The evidence is—

1. That of Surgeon Mew, government assayist, who has practised assaying for the army medical department for seventeen years, and who declares it perfectly feasible.

2. The evidence of such excellent concerns as Messrs. Gilpin, Langdon & Co., of your own city, a firm you all know and respect. This house is doing a large trade in assayed vegetable drugs, and the assays are made in its laboratory, where the chemist of the house has been engaged in this work for years.

3. The evidence of Messrs. Parke, Davis & Co., of Detroit and New York, which house manufactures a line of standardized Galenical preparations called normal liquids, which are coming into favor all over the United States and Europe.

4. The United States Pharmacopœia, with its assayed opium and cinchona.

This evidence represents some of the best chemical talent in the land. What are you going to do with it? There were learned men in the times of Columbus who called him impractical and visionary, but the great American nation of to-day is a tribute to his genius and a monument to their shame.

There is another class which objects to the adoption of further standards for drugs and Galenical preparations. The class to which I refer is not honest in its objections. The true reason why it objects is because standardization is being pushed by wholesale druggists and manufacturers, who must of nec

sity gain the commercial prestige resulting from the suggestion and adoption of such an important proceeding. This class argues that anything that comes from a "trade source" must be received *cum grano salis*. It is a class that scoffs at the idea of elevating pharmacy to the dignity of a profession. It calls the pharmacists "a lot of vile tradesmen and counter-jumpers," and refuses to give them any scientific or professional recognition. Some of the class edit and publish medical journals. These are often the most bitter. They say if pharmacy is recognized as a profession, then the pharmacist will ask space in their journals for the publication of scientific articles on pharmaceutical subjects. Everything relating to medicine from such a source is advertising matter, say they, and can only appear in our advertising pages, where it must be well paid for. This class will doubtless attack me for addressing you on what it is pleased to call a trade subject. I wish to say that I thoroughly appreciate the motive, and call your attention to the existence of a class of opponents who are, as it were, overturning heaven and earth in their mad effort to prevent further progress in this direction. As for me, I say all honor to these great commercial houses who are doing so much for the cause of science, the profession, and humanity. When any individual or concern invents a new thing, or makes a valuable discovery, and publishes exact knowledge of the invention or discovery for the benefit of science, whereby others are permitted to use this knowledge freely, I claim that such individual or concern should receive due credit therefor; that the knowledge is not advertising matter, but scientific literature; and I also claim that any refusal to give credit when it is due, and to prevent such publication of knowledge that it may only appear in the advertising columns of medical journals at the expense of the inventor or discoverer, is an outrage on humanity and a hinderance to the advancement of science and professional progress.

There is another class of objectors a little hard to classify. This class numbers professors in certain colleges of pharmacy, who, while more or less favorably disposed to standardization on general principles, oppose it through fear that its adoption will throw manufacturing still further into the hands of large manufacturing houses, and do away with the profession of retail pharmacists altogether. To such I would suggest that standardization offers a cure for the very evil referred to. As things are now drifting, the retailer is having a very "hard row to hoe." The manufacture of inorganic chemicals has long been vested in the large manufacturing houses of Powers & Weightman, Rosengarten & Son, etc.; physiological therapeutics has reduced drug-giving on the part of physicians to a comparative minimum, and ruined the prescription business; the cutters have entered into competition in the sale of patent medicines, and taken all the money out of that trade; and now somebody comes along, say they, and suggests a plan to rob the retailer of what little there is left. Then what will become of the colleges of pharmacy, and what will become of us? I am sorry for these gentlemen. I can, indeed, sympathize with them, for, as a pharmaceutical teacher and author, I am in the same boat with them. But, gentlemen, any attempt on our part to block the wheels of progress will only result in disaster to ourselves. The demand for physicians, druggists, and medicine in this country is limited, though large. For years the patent medicine trade has used every endeavor that capital, executive ability, and misleading advertising can accomplish to seduce the public from its allegiance to legitimate medicine. It is competition between scientific medicine on the one side and quackery on the other. The former cannot promise cures. Though it has done much to alleviate human suffering, it has not yet conquered consumption and other terrible diseases. But quackery promises anything and everything, and by a system of misleading advertising, whereby cures only, not failures, are reported, apparently backs up its bombastic pretension. The medical profession has seen the growth of its giant evil, which has been ruining legitimate medicine for years, and has used many endeavors to remove it. But the patent medicine trade has at last so thoroughly subsidized the entire press of the country, medical, secular, and religious, that it is silent on the subject. Without the support of the press, methods of reform are slow indeed.

But pharmacists, just so long as they made a fair profit in selling proprietary medicines, refused to heed the warning that they had taken a viper into their bosoms, which would sting them at last. The cutters came, the profits were cut off, and now there is weeping and wailing all along the line.

As I said before, I see in this question of standardization a remedy for the evil. It may not be a cure,—remedies are rarely that,—

but it will afford great relief. Insist on the standardization of every patent and proprietary medicine. How can that be done, and what good would it do? you say. It would absolutely destroy secrecy, and that would be a death-blow to a large number of these vaunted cures. Time will not permit me to go into details regarding the plan. My idea, carried out in full, is to pass and enforce laws which will prevent anybody from making and selling medicines unless properly qualified to do so, instead of having things in the position they are now in, whereby any ignoramus can mix up and sell any kind of a compound he chooses, and advertise it as a specific for disease. It includes the passage of a national law to prevent the transit of adulterated products from State to State, and State laws to stop the sale of adulterated products in each State. To discriminate what is meant by adulterated medicines, and to define what are below standard, and therefore unfit to sell, standards must be established. When applied to patent medicines, the standard to be adopted is that of the original formula. This requires its publication, destroys its secrecy, and removes in great measure opportunities for fraud. My plan, by throwing the entire manufacture and sale of medicine into the hands of educated pharmacists and destroying secrecy in medicine, would be a great relief to both physician and pharmacist, and of immense benefit to the American people. My plan includes a government laboratory at Washington or elsewhere, under charge of the medical department of the army, navy, and marine hospital service, and an investigation of the materia medica of the world under such auspices. I merely speak of it in this connection to suggest possibilities, and refer you to my paper on the subject, read before the Ninth International Medical Congress, entitled "A Proposed Investigation of the Materia Medica of the World, under the Auspices of the United States Government; a Plan to Promote Progress in the Science of Drugs" ("Transactions of Ninth International Congress," vol. iii. p. 10).

TREATMENT OF TUBERCULOUS BRONCHITIS BY HYPODERMIC INJECTIONS OF IODOFORM.

Influenced by the action of iodoform on pus globules, Dr. Gavoy announces in the *Gazette Médicale de Paris* for February 28, 1891, that in 1887 he was led to test this remedy in pill form in tubercular bronchitis, but the gastric distress and nausea caused by the administration of the remedy compelled him to substitute enemata for the internal administration in the pill form, and he has now for various reasons substituted for these methods the hypodermic method. He states that at the outset he employs, morning and evening, a hypodermic injection of a quarter of a syringeful of a solution of 1 part of iodoform in 100 parts of oil of sweet almonds. In very few cases, he states, is any febrile reaction produced, and the results obtained in the majority of cases are excellent. He maintains that in his use of this remedy the cough rapidly diminishes; muco-purulent expectoration, so characteristic of this specific catarrh, becomes more fluid, and finally ceases almost entirely; alteration in the character and hoarseness of the voice disappear; the lungs become more permeable to air; inspiration becomes deeper; the vesicular murmur acquires another character, and subcrepitant moist râles disappear, nocturnal sweats cease, the appetite returns, and the patient's general health improves. In fact, he states, that progressive improvement in the majority of cases indicates in the most positive manner arrest of this broncho-pulmonary catarrh of phthisis. He states that the examination of the sputum for bacilli is not an indispensable criterion for this therapeutic process, for the presence of the bacilli can only be exceptionally located at the onset of tubercular bronchitis, and, although the bacilli may exist in small closed cavities in the lungs, they only appear in the sputum when the ulceration has communicated with the bronchi. Further, iodoform is said to have the power of liquefying the more or less solid obstruction in the alveoli. He suggests that the therapeutic action of iodoform on caries of bone and on pus globules permits of the supposition that it may exert an analogous action on yellow tubercle and during the stage of softening, a condition which might be described as a caries of the lung. Although iodoform is an active antiseptic agent, it does not appear to have any direct action on the bacilli of tuberculosis other than in modifying the character of the tissues in such a manner as to delay or prevent the reproduction of the bacilli, and in aiding the elimination of the results of tissue breaking-down, and favoring the cicatrization of ulcers seated in the alveoli. He recommends in the warmest terms further tests with this remedy in this connection.

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Leading Articles.

THE PROPERTIES AND USES OF GELSEMIUM SEMPERVIRENS.

GELSEMIUM, by reason of its alkaloid gelsemine, is a powerful poison of the cerebro-spinal system, also of the excito-motor ganglia of the heart and respiration. The motor part of the spinal system seems to be especially influenced by toxic doses. Under the action of this drug, both cold- and warm-blooded animals become inert and torpid, and, at a more advanced period, paralyzed. There are, first, fibrillary movements and tremblings of the muscles, then tetanic movements, which put the limbs in forced extension, last but a short time, then, after a season of repose, come on again. These tetanic movements, by virtue of the rhythmical pauses alluded to, differ from the tetanus produced by strychnine; they are, moreover, preceded and accompanied by a loss of reflex power and by respiratory embarrassments, which still further differentiate them from the tetanic movements of strychnine.

In the THERAPEUTIC GAZETTE for August, 1886, page 550, are also presented Raimondi's comparative investigations, showing how the tetanic spasms of the one drug differ from those of the other. According to this writer, the effects of strychnine manifest themselves with equal intensity over the whole body, while in gelsemium-poisoning the posterior extremities show the clonic-tonic convulsions more distinctly than the anterior ones.

According to Berger, gelsemine has but little action on the sensibility. Noritz has, however, noted anæsthesia after the period of trembling. Berger affirms that it paralyzes the motor centres, diminishes the excitability of the peripheral motor nerves, and causes death by paralysis of the pneumogastric. Most experimenters, however, maintain that death results from paralysis of the respiratory motor ganglia, taking place in the midst of asphyxiating convulsions.

There have been numerous cases of poisoning by this drug; to many of them we have referred in former numbers of this journal (see THERAPEUTIC GAZETTE, 1885, p. 655, also 1890, p. 481). Among the symptoms which have been noted in the human subject are headache, dizziness, double vision, numbness of the fingers, difficult respiration, ptosis, and difficulty in moving the eyes or tongue. Reflex excitability is suspended, the pupil is dilated; at a later stage, the sensory columns of the cord are paralyzed, complete anæsthesia resulting. The toxic action of this drug is also manifested by coldness and a marked fall in the temperature, due, it is said, to slowing of the heart and depression of the circulation.

There is nothing in the physiological or toxic properties of gelsemium that directly suggests its therapeutic uses. Experiments on animals only indicate the most palpable lesions and disturbances of function, and teach toxicology rather than therapeutics. Nevertheless, when physicians have learned the toxic properties of drugs, they are the better prepared to test the effects of these drugs in small, safe doses in the sick. It might be inferred that any medicine which in so marked a degree as gelsemium affects the motor and sensory tracts and centres might be useful in modifying certain spasmodic and painful conditions. Such has been proved to be the case. More than one clinical experimenter has found gelsemium serviceable in combating local spasms. One of the latest instances is that of Dr. Imogene Bassette, as reported in the *Journal of Nervous and Mental Diseases* for June, 1890, and referred to in the THERAPEUTIC GAZETTE for July of the same

year. The case was one of spasmodic torticollis, the spasm being very severe in character, and obstinately resisting all the ordinary means of treatment. Notable improvement followed the use of large doses of the fluid extract of gelsemium, 13 minims every two hours, night and day; the uncomfortable symptoms experienced were, for a part of the time, headache and double vision.

A number of cases are on record of painters' tic, of pianists' cramp, of tetanoid contractures, which have been cured by the persevering use of moderate or pretty large doses of the fluid extract of gelsemium. Its efficacy, even in chorea, has been affirmed by Heroguelle. He would, however, be a hardy man who, in a disease so long and so obstinate, would rely on the continuous use of so heroic a remedy.

Dr. John B. Read, in the *British Medical Journal*, 1882, p. 1245, reports a case of tetanus cured by the fluid extract of gelsemium, given in 40 drop doses every two hours till subsidence of the symptoms, then in half that amount every two hours for several days. This patient took half a fluidounce a day for a whole week.

Gelsemium has been somewhat in use (if we mistake not, by certain eclectics) as a febrifuge, 1- or 2-drop doses of the tincture being administered every two hours. Its antipyretic action is, however, altogether too variable to warrant its use in fevers, and it is altogether probable that it does not produce any fall in the temperature, except through a depressant action on the heart and circulation, so that there is nothing to be gained by substituting this drug for the more certain and manageable antipyretics.

Gelsemium has been recommended for its efficacy in intermittent fever (J. D. Gaughey, in *Phila. Med. Times*, March 7, 1874), but surely the circumstances will be very few and far between that will call for the administration of this remedy in fever and ague, to the neglect of quinine and other of the specific remedies of this disease.

It is in neuralgic affections, and particularly in facial neuralgia, tic douloureux, and inferior dental neuralgia, that gelsemium has manifested the most signal therapeutic efficacy. We might, had we room, cite a long list of clinical authorities, in this country and abroad, who have found gelsemium a most efficient, if not always safe, antineuralgic. The dose is from 2 to 20 drops of a saturated tincture, or of the fluid extract, repeated every two or three hours, till the pain is controlled. There is great variability in the strength of different preparations, and this is perhaps the reason why some practitioners have had no success with gelsemium. It is, of course, best always to begin with a small dose, and to feel one's way along to the dose which is required.

According to Dujardin-Beaumetz, gelsemium and gelsemine merit a place as antineuralgic medicaments far below aconite and aconitine. That this remedy has sometimes been followed by remarkable results in the treatment of facial neuralgia, and neuralgias of the paroxysmal or intermittent form, he freely concedes. He has, however, "found it an uncertain medicament." The tinctures and extracts "were of no definite and uniform strength, a fact due probably to the circumstance that in making the fluid preparations all parts of the plant, as well as the root, were used, or possibly because pains were not always taken to obtain the fresh, green root; as a consequence, the same doses sometimes gave toxic effects, sometimes no effect at all." This clinical experimenter has abandoned in the treatment of neuralgias this drug as uncertain and dangerous. These inconveniences, he says, might be avoided by the use of gelsemine, but this alkaloid is yet but little known, having not been sufficiently studied, and seems much inferior as an analgesic to aconitine.

ON THE TREATMENT OF CHRONIC INDOLENT ULCERS.

CHRONIC ulcers are generally situated over the tibia, about the middle or lower third of the inner aspect of the leg. They are "callous" ulcers, with thick, hardened, almost cartilaginous borders and edges, with a sunken, pale, and dusky base; there is absence of florid granulations, and the secretion is then and often offensive. The indications for treatment of these ulcers, whose vitality has always been greatly compromised by chronic inflammation, are the following: To subdue inflammation and stimulate the cells of the part to new activity; to restore the normal circulation; to soften the indurated tissues which oppose cicatrization; to combat and destroy micro-organisms, which luxuriate in the part and keep up inflammation and necrosis; to remedy any existing dyscrasia, and fortify the constitution of the patient.

We shall not presume, in an article which

must be brief, to take up these indications in their order; any mode of treatment to be successful must aim to more or less meet them all. Sometimes granulating action is best promoted by stimulating astringent and antiseptic lotions, such as the *red wash* (sulphate of zinc, two grains; rose-water, one ounce), *liquor acidi carbolici* (a two per cent. solution), the *lotio nigra*, solutions of salicylic acid (one drachm to the pint), of tincture of myrrh (one drachm to four ounces of water), of nitric acid (one drop to the ounce of water), etc. "In a healthy sore," says Dr. W. Alexander, "where there is no mechanical obstruction to cicatrization, the lotion most rapid in producing the desired effect is chloride of zinc." An antiseptic chloral lotion (chloral, one drachm; water, four ounces) is highly commended by Dr. Dowse, of London.

In many cases which are not too far advanced, the mere fact of keeping out offensive microbes will often cause a healing process to start; here the use of a corrosive sublimate lotion, of dry calomel, as a local application, or simply dusting the sore with iodoform, and covering with antiseptic gauze and a simple roller, will be at once attended with the formation of healthy granulations and a contraction of the margins of the ulcer.

Should indolent ulcers ever be poulticed? Theoretically, poultices might be expected to fulfil several important indications, and instances will repeatedly occur when they will prove beneficial. Sometimes the indolent ulcer is irritable and needs soothing, and a linseed poultice is the best application; and always where it is desirable to produce active determination of blood to the part, and increase the formation of vessels and cells, poultices may advantageously be used, though the continuous warm bath, as recommended by Billroth, is even better. We thereby obtain an artificial swelling and softening of the dry, hardened borders of the ulcer. Zeis, who has often employed the warm-water bath in callous ulcers of the leg, also recommends this treatment as one of the most efficacious in such cases.*

The indolent ulcer generally refuses to heal on account of mechanical obstacles to cicatrization; the blood-vessels of the part are distended and toneless, if not atheromatous; the tissues are œdematous and swollen; the veins, it may be, are varicose. Here pressure judiciously applied is the indispensable means of cure. In all text-books a prominent place is given to a system of strapping, first devised by Baynton in the latter part of the last century; the adhesive strips are cut from an inch to an inch and a half in width, and long enough to extend about three-fourths around the limb, each band being so arranged as to overlap that which is below it, and drawn so firmly as to afford uniform support to the affected surface.

It was found that serious disadvantages attended this mode of treatment. The dressings had to be frequently removed, otherwise the pent-up discharge became very offensive. Dr. J. Gordon Black several years ago proposed a modification of the Baynton dressing, which has been quite successful; certainly, for varicose ulcers, no treatment could be better. For plaster, he uses the *emplastrum saponis*. This is first warmed by being passed through hot carbolic-water. "The sore, after being washed clean by the patient, is then saturated with weak solution of carbolic acid and the straps applied. The pieces of plaster should be two inches broad, and long enough to overlap four inches after passing completely around the limb. They should be applied after the manner of a 'Scot's dressing,' from about three inches below the lowest diseased surface to about the same distance above the highest. In their adjustment it is important to use no compression, but simply to lay them down evenly, so as to fit the limb accurately, and leave no creases in the plaster. Should pain be produced, the strap has been improperly applied, and should be at once removed. The bandaging of the limb lightly and carefully from the toes to the knee finishes the dressing. The patient may be told to return at the end of a week, when, on removal, the plaster will show only a slight moisture, instead of the profuse and offensive discharge seen when no antiseptic is used." †

Under this treatment, says Dr. Black, the horny edges of the callous variety quickly disappear, without recourse to such a dangerous excitant as blistering (a method recommended by Home, Cooper, and other of the older surgeons). In eight or ten dressings, even very extensive ulcers may be healed by strapping.

Mr. Nourse, a surgeon of Brighton, reports great success from strapping and bandaging, according to this method. ‡

On this principle (that of keeping up uniform pressure) it has been proposed to treat

* Billroth, "Surg. Path.," p. 399.

† "Braithwaite's Retrospect," Part lxviii. p. 195.

‡ *Brit. Med. Journ.*, May 31, 1873.

indolent ulcers by means of sheet leads, as in the plan described by Dr. Atkinson in the *Practitioner*, May, 1879. A piece of sheet lead is moulded to the leg, and kept on by an ordinary calico bandage. The size of the lead should be sufficient to cover the sore completely and lap a little over the whole skin; the edges and angles should be well rounded, so as not to chafe and irritate; it should be about an eighth of an inch in thickness, and moulded very accurately to the shape of the leg, so as to allow of no indent being apparent on the surface. After it has been carefully fitted, the leg should be carefully bandaged from the toes upward. The ulcer is uncovered night and morning, and a little weak sublimate water allowed to trickle over it.

Dr. Watson, in the *Boston Medical and Surgical Journal*, utilizes sheet tin for the same purpose. The dressing is known at the Boston City Hospital as the "tin dressing," and its method of application is as follows: The ulcer and surrounding surface are soaked in corrosive sublimate, 1 part to 4000, and thoroughly cleaned. A bit of protective is then placed on the surface of the ulcer, extending a little beyond the margins of the ulcer; oiled silk will answer the purpose. The tin, made to fit the surface on which it is to lie, is then placed on the protective, and the whole, as well as the surrounding tissues, covered with a dry corrosive sublimate gauze dressing, which is held in place by an evenly applied bandage, extending from the toes to the knee. Ulcers, which have been for a long time lagging, will often take a fresh start under this dressing.*

The treatment of indolent ulcers, and especially varicose ulcers, by the Martin rubber bandage, deserves mention, as being a very popular and very successful method. This treatment consists in applying a solid rubber bandage to the limb affected before the patient gets out of bed in the morning. It is not necessary that there should be any application between the ulcer and the bandage. The bandage is put on with just the requisite degree of tightness to prevent its slipping down. It is kept on all day, and only taken off at night on going to bed, when it is washed in warm water and hung up to dry. The ulcer is then covered with some simple dressing, which is kept in contact by a few turns of an ordinary roller.

Since the publication, about fifteen years ago, of Dr. Martin's memoir, "On the India-Rubber Bandage for Ulcers and other Diseases of the Legs," this mode of treatment has come into very general use everywhere, and a whole volume could be published made up of clinical reports and articles that have appeared on this subject alone. Surgeons like Clutton, of St. Thomas's Hospital, are enthusiastic in their praises of this mode of obtaining a uniform curative pressure; it is, says Clutton, "the best method yet devised of applying an old therapeutic principle." It is, of course, understood that this treatment is adapted to simple rather than specific ulcers; a syphilitic sore will demand the specific treatment in addition to the local.

But there are chronic ulcers which cannot be made to heal by any amount of strapping or bandaging; here multiple incisions have been recommended, as by Dr. F. Spaeth, in the *Practitioner*, May, 1888. This writer affirms that the lateral incisions and the circular incisions around the margin, recommended by Weber and Nussbaum, have generally proved unsuccessful. (This has also been the experience of Billroth, Verneuil, Nélaton, and others.) His method is more radical still. The entire ulcer is divided lengthwise by a deep incision, extending far into the healthy tissue. Cross incisions are then made through the callous tissue into the healthy at intervals of about three-quarters of an inch. The incisions must go through not only the skin, but the underlying fascia; the wounds must gape widely. The bleeding, often profuse, must be stopped with tampons; and the whole wound is then done up with iodoform dressings. "When, after eight to fourteen days," says Dr. Spaeth, "the dressing is changed, the difference in appearance is very marked. Healthy granulations are springing up in abundance from the gaping incisions, and soon cover the whole surface, reaching the level of the surrounding skin, from which the growth of new epidermis is seen to advance rapidly. . . . The advantage of this method is that highly vascular healthy parts are enlisted in the healing process of granulation, and thus not only the wound but the resulting cicatrix are under more favorable conditions. It might be expected, and facts confirm the expectation, that this cicatrix is far stronger and more resistant than the thin covering which may occasionally be obtained from scanty granulations, after the use, perhaps, of every means in the surgeon's armamentarium, and with great difficulty that."

* *Medical News*, October 15, 1887.

We have only space to mention without comment an ingenious device of Dr. Philip Cowan, which he calls "A New Method of treating Ulcers," and which is based on the fact that an ulcer is "a local asthenia of the skin and parts beneath," "a local tendency to degeneration and death." Availing himself of the property of absorption inherent in ulcerated surfaces, he would *feed the ulcer* with such nutrient substances as eggs and milk and flour, applied in the form of a paste to the part. He claims that his theoretical provisions have been proved to be scientifically well established by the results of practice, and gives reports of eighteen cases where the ulcers were "fed" till cured.*

Skin-grafting was introduced in 1869 by Reverdin, of Paris. It has proved to be a most valuable means of cure in many cases. The grafts are generally taken from the anterior aspect of the forearm, and include only the cuticle, with the rete mucosum and the apices of the papillæ. The grafts are placed about half an inch apart, and are confined by pieces of gutta-percha tissue and strips of plaster. With due care, it is quite easy to get a number to take, and thus there are provided "new centres of cutification," which also have the power of exciting cicatrization at the margin. Brilliant results have been obtained by this mode of treatment, which ought always to be tried in bad, intractable cases.

The constitutional treatment of indolent ulcers must be adapted to the cachexia accompanying or producing them. Some patients need only a general tonic and reconstituent treatment; others are gouty, tuberculous, or syphilitic, and demand the proper remedies for those dyscrasiæ. He will have the best success in treating chronic ulcers who best masters the various etiological factors concerned in their production.

THE GALACTAGOGUE PROPERTIES OF GALEGA.

IN our last issue we published a note as to the claim which has recently been advanced concerning the galactagogue properties of galega, and have since then received several inquiries from correspondents for more particular details as to the character of this drug and its mode of action.

The *Galega officinalis* is a leguminose plant, indigenous to Italy and the southern part of France, and has been known since the earliest times. In Guersant's "Dictionnaire des Sciences Médicales," published in 1816, it is stated that, as long ago as 1576, it was employed as a sudorific in the epidemic of pest, which was then ravaging Lombardy, but apparently without any satisfactory effects; and, in fact, the statement is there made that this plant possesses no properties which merit its attracting the attention of the physician, and that it might without loss be discarded from the materia medica. Ten years later Bèclard, Chomel, Cloquet, and Orfila published their "Dictionnaire," and likewise gave no better reputation to galega, for they stated that, although it possessed slight aromatic properties, and had been recommended as a sudorific in malignant fevers and epilepsy, there was not sufficient evidence as to its therapeutic value.

In 1873 a memoir was presented to the Académie des Sciences by Gillet-Damitte, calling attention to the value of this plant as a forage, this claim being based, in the first place, upon chemical analysis of the dry galega, published by Gaucheron, in which it was stated that this plant closely agreed in composition, both in the nature and in the proportion of its constituents, with that of the best cow's milk. Experiments were also alluded to in which it is stated that cows fed solely on this forage within twenty-four hours formed from thirty-five to fifty per cent. more milk than before this feeding was commenced. At the same session of the Académie des Sciences, Dr. Bourgeois presented a certain number of observations, which he had made and which, he maintained, pointed towards the efficiency of the syrup of galega as a galactagogue, and as to the advantage of using this plant as a fodder.

Since then numerous observations have been published by Cerisoli, Goubeaux, and Masson d'Audry, all of whom attributed more or less degree of activity to this plant in this connection, while in the *New York Medical Journal* for 1889, Dr. Millbank called attention to a proprietary remedy known as "nutrolactis," which was endowed with energetic galactagogue properties, and which was found to consist principally of an alcoholic extract of galega.

In the paper already referred to, read by Dr. Carron de la Carrière at the Société de Médecine Pratique, January 15, 1891, four cases are reported in detail, in which the properties of this substance were tested

* "Braithwaite's Retrospect," Part lxvii. p. 167.

(*Journal de Médecine de Paris*, February 15 and 22, 1891). Without going into the details of these cases, their results seem to show that the administration of watery extract of galega, prepared from the fresh plant, possesses the power of increasing both the quantity and the quality of the milk, while at the same time improving the general nutrition. The watery extract of the fresh plant is almost black in color, with pronounced odor, and is soluble in water, but incompletely soluble in alcohol. It may be associated with syrup, or may be administered in wine, or it may be given in the pill form. An infusion of 50 parts of the leaves to 1000 parts of boiling water has a greenish-yellow color, an aromatic odor, and is soluble in water, while it is not disagreeable to the taste. Dr. Carrière, however, prefers the watery extract, which he prescribes in doses of 15 to 75 grains daily, given in divided doses of 7½ to 15 grains.

It would be interesting to see whether other physicians confirm the claims advanced by Dr. Carrière.

ON THE ACTION OF SALTS OF CANTHARIDINIC ACID ON TUBERCULOSIS.

SINCE our last issue went to press, Professor Liebreich, so well known as the discoverer of chloral, and as a careful and reliable investigator, has, in a paper read before the Berlin Medical Society, held February 25, 1891, supported the claim as to the value of a compound of cantharidinate of potassium in the treatment of tuberculosis, especially when located in the larynx, his results being published in current numbers of the *Berliner Klinische Wochenschrift*.

As is well known, cantharidin was employed by the ancients, and we find mention of its use in the works of Hippocrates and Pliny, but little by little it has passed into oblivion on account of the accidents which its internal employment may produce; nevertheless, merely a cursory glance at medical literature will reveal reports published by numerous of the physicians of old times, especially in France, who claim marked curative properties for cantharidin.

Cazenave has mentioned that psoriasis may be cured by tincture of cantharidin, in the daily dose of 20 drops, while Hufeland recommended it in pulmonary affections, where it is claimed to have produced good results. Tincture of cantharides, however, has the great disadvantage of not possessing a constant composition, for the insects which serve for its preparation do not always contain the same proportion of active substance, the differences varying from three to six per cent., so that, to be sure of the action of cantharides, it is now generally admitted that the active substance, isolated by Robiquet and known under the name of cantharidin, should be employed. In addition to its well known special action on the genito-urinary apparatus, the researches of Cornil have proved that cantharidin causes the formation of cellular exudations. Aufrecht has found that, in submitting animals to repeated injections of cantharidin in doses almost poisonous, that nephritis is produced, with a small contracted kidney. Hansemann has, however, shown that, injected into a rabbit, a dose of cantharidin sufficient to kill the animal, produces a non-coagulable exudation in the capsules of Bowmann, which is free from cellular elements, while death is produced by paralysis of respiration.

At the autopsy, no œdema of the lungs can be recognized. These facts seem to show that, taken in a fatal dose, cantharidin does not produce such inflammatory action as is exerted on the skin, but that it gives rise to a pathological process in the capillaries, which causes a serous transudation; the production of this transudation is, therefore, the characteristic action, and exists in the capillaries of the lungs as well as in the capsules of the kidneys; but in the lung the transudation is less marked than in the kidneys, and one might imagine that if the lung possessed capillaries on the same plan as those of the kidney, and the kidney those of the lung, that cantharidin would prevent respiration but leave the kidney intact. Again, it might be supposed that capillaries which were irritated or inflamed would react to cantharidin more vigorously than healthy capillaries, and it might thus be possible to give doses of cantharidin which would be without action on healthy capillaries, but which would produce a transudation of serum around diseased capillaries. It is evident that this transudation would not be without influence on the nutritive processes in localities in which it took place, for serum might serve to reanimate the almost extinct activity of the cells, and, it being admitted that the serum of the blood possesses bactericidal properties (it is certainly true in the serum of a dog or of man), it is evident that if one could produce a transudation of serum at

the seat of pathological processes, marked therapeutic effects might be produced. After having convinced himself that cantharidin, in the form of cantharidinate of potassium, in small doses was not dangerous, this substance was then tested on several patients in the Augusta Hospital under the care of Dr. Ewald and Dr. Gunlich, while later experiments were made by Professor Hahn, Dr. Bode, and others. The first injections were made with a dose of $\frac{1}{820}$ grain, the quantity being gradually increased until it was found that about $\frac{1}{120}$ grain constituted the maximum dose.

Professor Liebreich stated that, although he did not wish to lay stress upon the benefit observed in cases of tubercular laryngitis, he had, nevertheless, seen marked improvement follow after the second injection, and that in no case, provided the kidneys were healthy, was there any untoward effect.

Professor Leibreich calls attention to the fact that the salts of cantharidinic acid now on the market are not sufficiently constant in their composition to be relied upon, and that to obtain a perfectly constant solution it is necessary to dissolve with prolonged heat absolutely definite amounts of cantharidin and alkali, and then to dilute carefully with water until the desired concentration is obtained. Professor Liebreich's experiments have shown him that the theoretical amount of alkali necessary to neutralize cantharidinic acid is insufficient, and that, if the hydrate of potassium is used, a double amount must be employed to produce permanent solutions. His formula, therefore, as published in the *Therapeutische Monatshefte* for March, 1891, is to weigh out 3 grains of pure cantharidin, 6 grains of potassium hydrate, dissolving in 320 minims of water (20 c.c.), heating the solution for a long time in a water-bath, and then add enough water to make a litre. If caustic soda is desired, 2 parts of cantharidin must be heated with 3 parts of caustic soda in the same manner, and dissolved in the same amount of water.

At the meeting at which this communication was read reports were presented by Drs. Paul Heymann, G. Guttmann, and B. Fraenkel, as to the results which they had obtained in the use of the cantharidinate of potassium in cases of tuberculosis (*Berliner Klin. Woch.*, March 2, 1891).

Dr. Heymann had used the cantharidinate of potassium in twenty-seven cases. Of these, however, only seventeen could be recorded as satisfactory. All of the cases were suffering more or less from serious tubercular affections of the larynx, while in all the lungs were also affected, and tubercular bacilli were recognized in the sputa. All were treated as outpatients, and no change was made in their ordinary mode of life. The dose injected varied from $\frac{1}{600}$ to $\frac{1}{150}$ grain. In a few instances headache and giddiness were complained of after the injections; occasionally there was slight diarrhœa. In some cases slight scalding was noticed on micturition, and one patient said he noticed blood once in his urine after the injection of $\frac{1}{200}$ grain. In all the cases where this remedy was tested other treatment was suspended, and in the majority of cases the claim is made that, after three or four injections, the voice improved steadily, until hoarseness almost entirely disappeared. The patients felt much better, the physical signs in the chest improved, expectoration became smaller in quantity, more mucous and less frequent, cough subsided, night-sweats diminished, and in one case headache and fever disappeared after the fourth injection. In tuberculous diseases of the tongue, after the use of this remedy, the granulations became flatter and paler, the ulcers became cleaner and began to heal, while in one case a patient who had almost entirely lost his voice, and who was a subject of tuberculous ulceration of the larynx, the ulcer entirely healed after nine injections, and after three more the only abnormity in the larynx was a scarcely visible infiltration of the vocal cords, while the physical signs in the chest had entirely disappeared. In no case, however, did he observe that the remedy produced any influence on the form or on the number of the bacilli.

At the same meeting, Dr. Guttmann spoke favorably of the use of this remedy, relating the case of a patient whom he had been treating for typical trachoma and recent granulation in the left eye. Laryngitis developing in this case, he was subjected to Liebreich's method of treatment, with entire relief, both of inflammation of the eye and of laryngitis.

Professor Fraenkel also stated at this meeting that he had commenced on February 7 to experiment with the cantharidinate of potassium, and had treated in all fifteen cases of laryngeal phthisis with it; five of these were presented to the Society. Under the influence of this treatment he stated that redness and suppuration of the cords steadily diminished, pain and swelling also disappeared, while the ulcers gradually became smaller, and, in some instances, healed en-

tirely. Aphonia, which had been present before, in most cases disappeared. He also stated that he was able to confirm Liebreich's views as to the action of this remedy, for in one case he had actually seen a serous exudation develop in the larynx, and when this patient coughed he brought up serous liquid. Professor Fraenkel thinks he has been able to observe a direct influence on the bacilli, noting that they seem to diminish in frequency and to have lost their reaction to coloring-matter. No claim is made that any one of these cases is cured, but the improvement is stated to have been most brilliant.

The meeting of the Berlin Medical Society, held on March 4, was also mainly occupied with a discussion of the action of Liebreich's new remedy for tuberculosis, and the most striking feature developed is, in the first place, the extreme caution with which the statements are made; and, second, that the constitutional disturbance produced by this remedy is insignificant as compared with that which followed the use of Koch's remedy.

Dr. Saalfeld (*Lancet*, March 14, 1891) showed a case of lupus of the cheek, which had been greatly improved by this remedy. Dr. Liebreich declared that the remedy in repeated doses produces œdema of inflamed mucous membrane, while small doses cause increased expectoration, and that the signs of œdema rapidly disappear; further, that the action of this remedy is to promote exudation of serum from blood-vessels. Dr. Lublinski had employed cantharidinic acid in sixteen cases, and alluded to the fact that there was some pain excited by the method, and he had seen headache, diarrhœa, strangury, and slight hæmoptysis follow it, although he had never exceeded $\frac{1}{110}$ grain a day. Several ulcers in the larynx rapidly healed, and a diminution took place in the size of lupus patches. Professor Fraenkel had also noted improvement both in the cough and in the physical signs in pulmonary phthisis, and in two cases a notable subsidence of the hectic fever. He had, however, met with strangury and albuminuria as a consequence of the treatment, which, in view of the renal troubles, he urged should be employed with the greatest caution. Professor Liebreich also emphasized a fact which is worthy of notice, and that is, that no rise of temperature is caused by the injections; he also repudiated the claim of cantharidinic acid being a specific, mentioning simply the power which it had of producing serous exudations in local inflammations, and stated that what he termed "serum therapeutics" might be found applicable to many other diseases than tuberculosis.

Reports on Therapeutic Progress.

KOCH'S TREATMENT OF CUTANEOUS TUBERCULOSIS IN PARIS.

In the latter part of November, 1890, there was constituted at the St. Louis Hospital in Paris a committee composed of Drs. Vidal, Besnier, Fournier, Hallopeau, Quinquand, and Lailler, deputed to study and report on the effects of Koch's lymph on the cutaneous forms of tuberculosis, more especially lupus. In the *Lancet* for February 28, 1891, the Paris correspondent of that journal gives the following account of the results obtained by this committee:

A male and a female ward were set apart for the purpose, and a special staff of students detailed for taking and registering clinical observations. All the patients, numbering fifty, were first carefully examined *seriatim* by the assembled committee, and, the diagnosis verified, the programme of inoculations for each case (date of repetition and dose) was made out, subject to modification. Each patient was, moreover, kept under observation for several weeks after the termination of the treatment (the end of January). All necessary antiseptic precautions were taken, and the whole inquiry rendered as precise as possible. On the 13th inst. MM. Besnier and Hallopeau presented in their turn to the Société de Dermatologie et de Syphiligraphie a very full report of the proceedings of the committee, illustrating it by a table, giving the following heads of information: Age and sex of patient; diagnosis; number and date of inoculations, with doses; principal phenomena of the inoculatory fever; characters of the local reaction; date when tolerance was established; other phenomena and complications observed; result of the treatment; name of the physician treating the case. The table contains the history of thirty-eight cases, the remaining twelve not being included because certain of them were cases of leprosy, while in the rest the treatment had either been interrupted or had been undertaken too recently to merit a place in the list. After a few introductory remarks, M. Besnier said: "There is one feature attending the application of the method which the appended table

cannot bring home to your minds. No mere reading will enable you to adequately appreciate its importance, and I am surprised that, in so many published accounts of the inoculations, this aspect of the question is glossed over with such a light heart. I refer to the suffering inflicted on many of the patients experimented upon. Whoever has visited our wards six or eight hours after a series of inoculations of patients who had not yet reached the period of tolerance will never forget the spectacle." The above remark furnishes the key-note to the criticisms that follow. The speaker added that, although no fatal result had occurred in their practice, several of their patients had, despite precautions as to dosage, frequency of inoculation, etc., been in danger of falling victims to the action of the toxine. Two points dominate the history of these experiments,—viz., 1, *local reaction:* its insufficiency, its progressive diminution in spite of the increased dosage, and its ultimate cessation; 2, *general reaction:* its noxious effects in certain cases, the serious localization of its action on the viscera in general, and on the circulatory system in particular, and finally the risks of a fatal result even with feeble doses, and even after a single injection. The committee deny the germicidal properties of the liquid, as also its power of sterilizing the tissues invaded by the bacillus. When a patch of lupus is inoculated with the liquid, its local effects do not exceed those excited in healthy skin, cellular tissue, or muscle into which it is injected. Nay, there is reason to believe that, thus employed, it tends to favor the tuberculous process. In a little boy affected with lupus of the lower extremities a patch was inoculated with the liquid, and that patch is now, several weeks after the operation, considerably more florid than its neighbors. The inoculations provoke local irritation of an exudative nature, with a tendency to consecutive cicatricial atrophy; but this tendency is followed by a revival of the tuberculous nodules, which appear to be endowed with greater vitality than ever. In the cases experimented on not only have all the nodules reappeared, but fresh ones have also sprung up. As to the alleged affinity of the liquid for tuberculous tissues, the committee need only call to mind the following phenomena noted before, coincidently with, or independently of, the irritation of the lupus parch,—viz., hyperpyrexia, leucocytosis, diminution of red blood-corpuscles, cutaneous eruptions, endocarditis, pulmonary, splenic, and renal congestion, hæmaturia, albuminuria, arthropathies, and many another neurodynia affecting viscera certainly free from tuberculosis, or which are simply in a state of physiological congestion,—*e.g.*, the ovaries in menstruating women. The ephemeral fever of Koch generally reveals itself locally in cicatricial or "closed" lupus by the provocation of inflammation of an erythematous, erythemato-squamous, or erysipelatous type, bearing a great resemblance to the recurrent attacks of lympho-dermatitis so common in cutaneous tuberculosis. In "open" lupus the reaction is more manifest, being characterized by a serous discharge, œdema, and the formation of scabs,—a rare occurrence in "closed" lupus. In all forms of lupus the local reaction may be intense, but at St. Louis it has never been seen of such violence as to cause loss of substance. In every case the reaction is only a passing storm, which subsides in a few days, excepting when the operation has excited phlegmonous inflammation in glands, or in the neighborhood of joints. The storm over, a more or less marked reduction in volume is noted in the pathological mass, together with a diminution of vascularity of the adjacent tissues, followed by a certain levelling of the surfaces affected. Sometimes there is also noted an obvious tendency to cicatrization, which appears extraordinary only to observers imperfectly acquainted with the normal lupic process. This curative effort is sometimes very remarkable; but even when it is very marked the tubercle is never destroyed. A striking case was cited in support of this statement. This partial or general reduction in volume is not always proportionate to the intensity of the apparent reaction. It is observed more particularly in the upper lip or other parts where the lesion is complicated by the chronic lymph œdema which is so pronounced a feature in certain cases of lupus. Should this constrictive process occur in lupus of a cavity, such as the nose, much relief is experienced from the restoration of the patency of the passage. In buccal, pharyngeal, and laryngeal tuberculosis the same relief may be conferred. But even after reiterated inoculations the previous condition is not only re-established, but it becomes sometimes aggravated. Of the lupic patients who have been benefited the most from the treatment, not one has been cured, the improvement having been only temporary. In not one of the cases of lupus of the parts situated behind the nostrils has

cicatrization of the ulcers been obtained. In the majority of the cases tolerance has been established, and the experiments have thus necessarily been brought to a premature conclusion. Even should the susceptibility to the action of the liquid reappear at a future time, no advantage will have been gained, for fresh tubercles will have developed in the mean time. It is a case of "No thoroughfare!" Several writers have compared the action of Koch's liquid to that of the (now rare) intercurrent attacks of erysipelas sometimes seen. But even in its most intense form the local reaction excited by tuberculin never attains the proportions, nor does it present the same characteristics of form and duration, of true erysipelas. A single attack of this latter disease effects a cure apparently more complete than has been noted in any one of the fifty patients of the committee. It should be remembered, however, that even erysipelas never cures lupus. In none of the patients of the committee has there been obtained a result superior, or even equal, to that realized in the same time by ordinary methods of treatment. Painful as these latter are, they occasion less suffering than is entailed by the fever consecutive to inoculation. M. Besnier thus sums up: "1. In cutaneous tuberculosis in general, and more particularly in all the divers forms of lupus, the inoculation of Koch's liquid is productive of a local reaction, the earliest effect of which is the temporary reduction of the morbid mass. Very appreciable in all the 'open' varieties of the lupus of Willan, this atrophic process becomes less marked in the 'closed' varieties, and is still less in the dry, sclerotic, fibrous forms. The minimum result is seen in the lupus of Cazenove, all the varieties of which are dry and 'closed.' In all these forms the beneficial effect may be considerably increased by the simultaneous employment of any therapeutical measures which excite deep irritation of the lupus, or which convert it into the 'open' variety. In the immense majority of cases the treatment, even when pushed to tolerance, is incapable of curing; it is not superior, indeed it is not equal, to methods of treatment in actual use. 2. In every case, without exception, however feeble the dose injected, the local reaction cannot be evoked without the ephemeral fever, the intensity of which cannot be predicted, but which, even with small doses, and with a single inoculation, may kill the patient. Even when the patient does not succumb, the toxine may occasion grave persistent symptoms in relation more particularly with the circulatory system, the brain, or the kidneys, not to mention the awakening into renewed activity of tuberculous deposits which had hitherto lain dormant. 3. Such being the case, I do not consider myself, nor do I deem any other physician, authorized to continue these experiments with Koch's liquid. In refusing to persevere with the application of the method, I believe I am only acting in conformity with the dictates of humanity, and with that respect for human life which is one of the noblest characteristics of French medicine." M. Hallopeau continued in the same strain, and gave it as his opinion that, the therapeutical value of the liquid being at best extremely limited, its employment is for the present contraindicated.

THE TREATMENT OF PNEUMONIA BY LARGE DOSES OF DIGITALIS.

We have on one or two previous occasions called attention to the mode of treatment recommended by Dr. Petresco of combating pneumonia with large doses of digitalis, and in the *Therapeutische Monatshefte* for February, 1891, this author publishes an additional communication on this subject, in which he offers a number of arguments and reports of a number of cases to support his position as to the value of very large doses of digitalis in this disease. The dose which this author recommends is simply enormous in contrast to that which is ordinarily regarded as the safe dose of digitalis, Professor Petresco stating that he does not hesitate in single doses to give as much as 180 grains of digitalis-leaves in twenty-four hours, although he admits that ordinarily the dose for twenty-four hours does not exceed 25 grains. He prefers the infusion made with 4 parts of digitalis-leaves in 200 of water, and then adding 40 parts of syrup of orange-peel, the dose then being a tablespoonful every half-hour. He states that in general this dose is very well borne, and that he has never met with a single case of poisoning. Dr. Petresco meets the incredulity which has been expressed as to the tolerance of these large doses, with the explanation that he can only have employed inferior quality of digitalis-leaves, with a denial, and states that he has employed the leaves obtained from all the best pharmacists in Europe, with, as a rule, the same results. He states that he has obtained the best results in genuine fibrous or croupous pneumonia. In infectious pneu-

monia he has usually combined it with antiseptic methods. He also states that he has obtained satisfactory results in cases of pneumonia complicated with bronchitis and pleurisy, and he claims in the most positive manner to have cut short undoubted cases of croupous pneumonia, so that within twenty-four to forty-eight hours—the time necessary for the effects of the digitalis to be demonstrated—he has succeeded in obtaining sudden and almost absolute reduction of the temperature to the normal, accompanied with reduction of the pulse, while at the same time this disappearance of fever is accompanied by general improvement in the patient's condition, pain and cough being diminished, the temperature becoming normal, while the healing process rapidly goes on to completion. These large doses, with the exception of but rare cases, are without effect on the digestive canal, although sometimes he has met with vomiting as the result of this method of treatment. The most evident symptom detectable as to the effect of this medication is the marked slowing in the pulse, with increased tension. The author publishes a number of sphygmograms, illustrating the effect of digitalis on the pulse in cases of pneumonia, and concludes his paper with the following deductions:

1. Digitalis has an important antiphlogistic action only in its special therapeutic dose.

2. Its specific therapeutic dose of digitalis amounts to from 75 to 150 grains of digitalis-leaves administered as an infusion in twenty-four hours.

3. This dose may be administered in from two to four days continuously, according to the severity of the case. In some cases from 300 to 375 grains of digitalis leaves being given in four or five days without symptoms of nausea, or in fact, any toxic effect. Treated with this dose, the temperature in cases of pneumonia falls from 1° to 3° C. after a single dose, and from 5° to 6° C. after three doses, while the pulse is slowed from 40 to 60 beats in the minute after six doses. This reduction in the pulse-frequency and in the temperature lasts from ten to twelve days, by which time the normal condition has been gradually obtained.

4. Simultaneously with this diminution in the rate of circulation and respiration, disappearance of all the local symptoms of pneumonia can be noted.

5. The value of this method of treatment is proved by statistics, the mortality of cases of pneumonia so treated with high doses of digitalis being much less than that observable when any other method is employed.

6. The value and harmlessness of this therapeutic dose of digitalis is established by the author's numerous individual experiments and by the cases reported by his scholars.

7. From studies as to the value of this method of treatment the author concludes that the expectant method of treating pneumonia is not only irrational but even dangerous; that the assumption that there is a definite cycle of progress in pneumonia is not warranted; that pneumonia may be cut short by an energetic rational mode of treatment, especially if the method is inaugurated at the onset of the disease, and that, finally, the claim is supported that the treatment of pneumonia with large doses of digitalis furnishes better results than that obtainable by any other mode of procedure.

ANTIPYRIN AND MERCURIC CHLORIDE.

The behavior of antipyrin in the presence of mercuric chloride forms the subject of a communication by MR. PETSCHE (*Pharm. Rund.*, February, p. 34). He states that upon mixing cold aqueous solutions of antipyrin and mercuric chloride, a white precipitate is formed. This disappears upon heating the liquid to boiling, but after keeping it at that temperature for a time a brown resin-like substance is deposited, which, when separated, dissolves in nitric acid, and is colored scarlet by sulphuric acid. This resinoid substance dissolves in boiling alcohol, and is partially deposited again from the liquid on cooling. The insoluble portion when dried yields a reddish-yellow powder, acid in reaction and bitter in taste. When heated on platinum-foil it melts and takes a scarlet color before charring. It dissolves in nitric acid, and the yellow solution becomes scarlet when sulphuric acid is added, but upon being heated turns yellow again, and eventually evaporates with a white fume, leaving no residue. With hydrochloric acid it gives a yellow solution that becomes red upon being heated, and leaves a yellow residue upon evaporation. A solution in hot alcohol gives a white precipitate with ammonia water, but not with water acidulated with hydrochloric acid. The portion of the original resinoid substance soluble in cold alcohol is obtained upon evaporation as a white, readily-powdered resin, acid in reaction, and very bitter, and giving color-reactions very similar to

those of the insoluble resin. It differs, however, in dilute hydrochloric acid throwing down a white precipitate from an alcoholic solution —*Pharmaceutical Journal and Transactions*, February 28, 1891.

THE INFLUENCE OF EXTRACT OF VALERIAN ON THE DESTRUCTION OF GLUCOSE IN THE BLOOD.

At a recent meeting of the French Académie des Sciences, Dr. Butte announced the results of some experiments which he had made as to the action of certain remedies, and especially the extract of valerian, on the destruction of glucose in the blood, his results being embraced in the following conclusions (*La Tribune Médicale*, February 26, 1891):

1. The addition of sodium bicarbonate and morphine to blood freshly shed delays the destruction of glucose.

2. On the contrary, curare accelerates this destruction.

3. The addition of extract of valerian has the effect of producing a marked diminution in the power which the blood possesses of destroying glucose.

4. Normal blood rapidly causes the disappearance of a large quantity of glucose added to it.

5. Extract of valerian injected into the blood-vessels acts in the same way as in experiments made outside the body,—that is, it slows the destruction of glucose contained in the blood.

THERAPEUTIC ACTION OF NITROGEN MONOXIDE.

Influenced by the statement that nitrous oxide has produced satisfactory results when inhaled for the relief of depressing emotions in hypochondriacal and neurasthenic subjects, Dr. W. R. Birdsall has undertaken a series of experiments to determine its therapeutic value, not as an anæsthetic for surgical purposes, its use for this purpose being well known, but for the relief of disease, when given by slow and prolonged inhalation short of the production of unconsciousness, and his results are embodied in a paper read before the New York Neurological Society on January 6, 1891 (*New York Medical Journal*, March 7, 1891).

It is exceedingly difficult to determine the therapeutic value of any agent or substance used as a remedy, and it is particularly difficult to determine whether any improvement which follows the administration of an agent should be attributed to it or to other causes. When the morbid process is chronic, varying factors which modify it can rarely be discriminated with accuracy. Observing the effect of a therapeutic agent on the general course of a given disease, is, as a rule, an uncertain method, and we can usually arrive at more positive data by noting the effect it produces on separate normal functions and their abnormal manifestations. Dr. Birdsall's studies, therefore, were at first confined to the testing of the nitrogen monoxide in relieving certain symptoms of morbid states, such as pain, spasm, and some morbid mental states. Two cases of migraine and one of persistent headache were treated by a number of repeated inhalations of the gas with no decided relief noted. In the case of paralysis agitans, no effect was noted on tremor or pulse-rate. In the case of asthma with chronic bronchitis, no diminution of the spasmodic asthmatic respiration was observed during inhalation, nor was any change noted on auscultation.

In two cases of insomnia, one with slight melancholia with chronic cardiac disease, no appreciable effect was obtainable, and, in fact, a negative result is stated to have followed its employment in cases of opium habit, two cases of hypochondriasis, one of neurasthenia, one of chronic bronchitis, and one of hysteria. The chief cause of the failure, according to the opinion of Dr. Birdsall, is the transient effect of the gas due to its rapid elimination. During its administration, if we leave too long an interval between the inhalations, the most intense effects will become so reduced that a considerable quantity of gas must be again taken to bring up the effects to the former degree, while slow but continuous inhalation will hold the effects with a very small amount of gas. The extensive series of experiments published by the Odontological Society of Great Britain show that the average time required for the production of anæsthesia is eighty-one seconds, and the time from the beginning of anæsthesia to recovery of consciousness but one hundred and fifteen seconds, showing the rapidity with which the gas is eliminated.

Dr. Birdsall reviews the various theories as to the physiological action of nitrogen monoxide supported by different observers, and concludes from his own experiments and the examination of this literature that the effects of nitrogen monoxide are attributable to the interference by displacement of the normal s

ply of oxygen to the tissues, and as the cortical functions are the most rapidly disturbed by imperfect oxygenation the cerebral disturbance is the most striking effect which follows administration.

Finally, Dr. Birdsall's opinion is that the uses of nitrogen monoxide are restricted to its effect as an anæsthetic and as a placebo.

In the discussion which followed, this opinion was coincided in by Drs. R. L. Parsons, W. M. Leszynsky, W. J. Morton, and C. L. Dana.

THE GERMICIDAL PROPERTIES OF BLOOD.

A great deal of important information has lately been obtained on this subject, and Von Fodor, who has already contributed some useful papers, publishes in the *Centralblatt für Bakteriologie und Parasitenkunde*, vii. No. 24, some further experiments which he has made, especially directed to ascertain under what conditions the germicidal properties of the blood are at their highest, and in what way the composition of the blood affected these properties. The first series of researches had reference to the composition of the blood, and proved, in the first place, that arterial blood has a more destructive action on the bacteria than venous, and also that fresh blood has a more powerful action than that which has been shed for some time. Again, the germicidal power of the blood was weakened in an atmosphere consisting entirely of oxygen or carbolic acid; on the other hand, the removal of gases from the blood had no appreciable influence. The blood of rabbits which had been poisoned by carbolic acid gas was not fatal to the bacteria. As regards the influence of the movement of the blood (circulation), experiments were made by placing the blood of rabbits, which had already been inoculated, in small globes, some of which were kept in constant movement and others quite stationary. No appreciable difference was observed. Some very interesting results were obtained in reference to the temperature of the blood. From these it would seem that the germicidal power of the blood increased with the rise of temperature, reaching its maximum at 38° to 40° C., and then again gradually diminishing. The author mentions an interesting fact,—*i.e.*, that the individual predisposition of any animal to an infectious disease seemed to stand in direct relationship with the germicidal power of its blood. The second series of researches was directed to the influence of drugs on the power of the blood to destroy germs. Hydrochloric acid had no effect. After treatment by tartaric acid a marked decrease was noticed, and the same result was produced by quinine. Common salt and carbonate of ammonium caused a slight increase of the power, the phosphate of sodium a more marked effect, while the carbonates of sodium and potassium produced a very remarkable increase. From the experiments the author concluded that any drugs which cause increased alkalinity of the blood considerably raised the resisting power of the organism against the inroad of bacteria. The third of this series of experiments corroborated this supposition. Of eight rabbits inoculated with anthrax, all died, while of nineteen which had been previously injected with soda solution, only three died, thus proving the efficacy of the alkalization of the organism. Of the remaining sixteen cases, a few were affected at a later date, but the majority remained perfectly free from disease.—*Lancet*, February 28, 1891.

THE RÔLE OF THE LIVER IN THE PRODUCTION OF UREA.

Until the time of Prevost and Dumas, it was believed that urea was formed in the kidney. These physiologists proved by their experiment of removing the kidneys in animals that urea is performed in the blood or in the tissues, and from that day the kidney has been regarded rather as a filter than as a secreting organ destined to elaborate substances not previously existing in the blood.

Subsequently the doctrine was promulgated that urea is formed everywhere in the economy where nitrogenous waste is going on, its sources being metabolism of tissues and of unassimilated food proteids. The muscles were believed to constitute no inconsiderable source; Wurtz's observation, that lymph contains more urea than blood, is suggestive of a direct relationship between urea and tissue metamorphosis.

The facts which have given rise to the belief that the liver is the principal, if not the only, producer of urea may be briefly stated as follows:

It was discovered as early as 1846 that the urine of persons affected with chronic hepatitis contains little or no urea; twenty years later, Meissner, basing himself on accurate analyses of the urine in acute yellow atrophy of the liver, laid down the law that destructive diseases of the liver entail diminution or

suppression of urea. Bouchardat, in 1867, proclaimed that certain lesions of the liver are attended with augmentation of urea production, while others cause diminution. Brouardel and Murchison enriched medical literature by new observations, showing "that the quantity of urea secreted and eliminated in twenty-four hours is dependent on two principal influences: the state of integrity or alteration of the hepatic cells, and the greater or less activity of the hepatic circulation.

In those cases which are characterized by augmentation of urea, the liver has not been found to be the seat of grave organic lesions, but only of simple functional disturbances, a hyperæmia, it may be, similar to what is observed in a certain number of cases of diabetes. In one case of spasmodic icterus, Bouchardat noted the enormous quantity of one hundred and thirty-three grammes of urea in the twenty-four hours, and the excretion continued in this proportion for three or four days. Fourcroy and Vauquelin also announced about the same time (1846) that in icterus the urine may contain a very large proportion of urea. Fouilhoux subsequently reported a case of simple hepatitis in which the figure of urea was double the ordinary.

Facts of the second group—where there is diminution of urea—belong to cases of destructive lesions of the liver, where the whole extent of the hepatic parenchyma is affected. Under this head we find acute yellow atrophy of the liver, common cirrhosis, cancer of the liver which has invaded large portions of that gland, hydatid cysts, abscesses of considerable dimensions, granulo-fatty degenerations of the liver, whether following grave infectious fever, or induced experimentally in animals.

Meissner's treatise contains the principal observations which have been made on animals confirmative of the pathological observations above mentioned. According to this authority, urea is not found in the muscles or in the lungs of mammals, but almost exclusively in the liver. In the liver of a dog which was bled to death several centigrammes were obtained; the organ was carefully washed and the vessels flushed out with warm water before being subjected to analysis. The results obtained by Meissner have been confirmed by Cyon, who concludes "that there is a real and rapid production of urea in the passage of the blood through the liver." Cyon appeals to facts similar to those adduced by Claude Bernard to prove that the liver produces sugar: the blood of the hepatic vein is found to contain more urea than the blood of the vena portæ.

Lecorché and Talamon do not dispute the proposition that the liver produces urea, or that there is more urea in the hepatic than in the portal vein; they do dispute that the liver is the sole or the principal urea-forming organ. To the statement that in destructive diseases of the liver there is a diminution of urea, they oppose careful observations of their own, where, despite such destroying lesions (diffuse cancer, diffuse venous cirrhosis), the quantity of urea remained normal. This fall in the proportion of urea, of which Murchison and Brouardel make so much in its application to serious hepatic lesions, is equally characteristic of every disease of long duration, of every cachexia, cancerous, tuberculous, or otherwise; it is, however, true, as a general rule, that in affections which alter the structure of the liver, the fall in urea-production is a little greater than in the chronic diseases of other organs. This is easily explained on the ground that the liver is an organ of great magnitude and importance; "it is quite natural that the quantity fabricated should fall considerably when a centre of formation so important is suppressed, but it will not do to push too far the consequences of this fact, and make ureopoiesis —that is, *urea-making* (from the Greek)—a special function of the liver." In fine, the diminution of urea and the appearance of leucine and tyrosine and extractives in the urine are not accidents proper to acute yellow atrophy or other wasting diseases of the liver, "but simply an episode of the general perturbation imposed on the phenomena of disassimilation of the entire organism by the infectious disease."

Lecorché and Talamon next take up the facts adduced by Murchison and others, from which the conclusion is drawn that in states of hyperæmia, or excitation of the liver, the production of the urea is exaggerated. This they admit to be true, but "polyuria, with augmentation of urea, is not peculiar to hepatic affections, being only a critical phenomenon, such as may be observed in any other acute disease; lastly, if physiology seems to have demonstrated that urea is formed in the liver, clinical observation does not permit us to believe in a special function of that gland, but only in a phenomenon of disassimilation, such as takes place likewise in the intimate substance of all the tissues of the organism."

This, then, which is really the older doc-

trine, may, we think, be regarded as the latest authoritative teaching of science respecting the puzzling question of the sources of urea in the economy.—*Boston Medical and Surgical Journal*, February 26, 1891.

A SIMPLE TREATMENT FOR CORNEAL ULCERS.

According to the Paris correspondent of the *Lancet* for February 28, 1891, M. VALUDE, one of the ophthalmic surgeons of the Quinze-Vingts Eye Hospital, communicated to the Académie de Médecine on February 10 a new method of treating those troublesome cases,—ulcers of the cornea,—so simple in its application, and, according to its inventor, so successful in its results, that it cannot fail to be generally adopted. Hitherto corneal ulcers complicated with hypopyum have been treated by puncture either by the knife or thermocautery, this operation having frequently to be repeated, and too often leaving behind it opacities, if not actual staphyloma. For this unsatisfactory method M. Valude substitutes a simple dressing, consisting of a pad of salol gauze, which, with a moistened gauze bandage, effectually seals the eye and maintains a certain amount of compression. Before being applied, the eye is carefully disinfected. The dressing is not renewed until after three or four days have elapsed, when the ulcer is found to be already healing, and the collection of pus in the anterior chamber much diminished. M. Valude states that the cornea tends to regain its original transparency without any opacities. In corneal ulcers uncomplicated by hypopyum, M. Valude, relying on his experience of fifteen successful cases, asserts that this new treatment is *the* treatment *par excellence*.

ACTION OF ANTIPYRETICS.

The action of antipyretics may be supposed to be due to the limitation of the oxidation processes and consequent lowering of heat development, or to an increase in the heat radiation from the surface of the body. Moreover, they may have a purely local action,—*i.e.*, on the cellular tissue,—or they may influence the nerve-centres, regulating the development or radiation of heat. MESSRS. SAWODOWSKY and PODANOWSKY consider that they have proved that the lowering of temperature produced by antipyrin and antifebrin is attributable exclusively to their influence upon the brain-centres regulating the temperature, which occurs in the corpus striatum (*Apot. Zeit.*, February 11, p. 87). The authors in an experiment cut the brain of an animal through close behind the corpus striatum and thalamus opticus, so as to isolate the organism from the heat-centres, while the connection with the respiration and vasomotor centres was retained. Although the animal so treated lived for some time, and the arterial blood-pressure and breathing remained unaltered, the body temperature fell continuously. Even injections of the most powerful pyretics, such as putrescent matter, caused not the slightest rise of temperature, although all the other symptoms of putrescent infection were present. Equally powerless were antipyrin and antifebrin to hinder in the slightest degree the fall of temperature. The skin temperature also remained entirely unchanged, although in the case of normal animals this rises considerably after the injection of antipyretics. An apparent exception was noticed in the case of quinine hydrobromide, but this was attributed to the known action of bromine. The conclusion drawn by the authors is that the action of quinine salts—resorcin and thallin—in lowering the temperature is dependent upon their specific influence upon the temperature regulating centres situated in the anterior part of the brain.—*Pharmaceutical Journal and Transactions*, February 28, 1891.

THE TREATMENT OF HYPERTROPHIC MUCOUS PATCHES BY APPLICATIONS OF TANNIN.

The difficulty which attends the treatment of certain hypertrophic forms of the secondary manifestations of syphilis, and especially hypertrophic mucous patches around the anus, is well known. Mucous patches in this locality frequently acquire considerable volume, aggravated by the secretions of the part, and again an entertrigo may arise, which frequently persists, in spite of the cure of similar accidents elsewhere through the influence of general or topical treatment, such, for example, as the nitrate of silver. Of the various agents which are frequently employed as topical applications in this state of affairs, tincture of iodine may be dismissed as being more painful than efficacious. Actual cautery, if the patient will submit to it, may give somewhat more satisfactory results, while mercurials, which are so valuable in most of the cutaneous manifestations of syphilis, are here inert, or, at the

best, extremely slow in their action. In the *Gazette Médicale de Paris* for February 28, 1891, DR. THIERY states that he has had most satisfactory experience with the employment of tannin in such conditions, and he reports three cases of hypertrophic mucous patches situated around the anus which were cured within twelve days by the application of tannin applied twice daily. Tannin, nevertheless, does not possess any specific action on secondary mucous syphilomata, for the author states that his results have been much less satisfactory in the treatment of buccal patches.

THE ANTIPYRETIC TREATMENT OF FEBRILE AFFECTIONS OF CHILDREN.

In the yearly report of the Children's Hospital of Berne, PROFESSOR DEMME publishes a number of rules as to the selection of antipyretic measures in the treatment of various febrile affections in children, and his results, which are exceptionally valuable, in that he has rich experience, are published in the *Wiener Medizinische Blätter* for January 1, 1891.

In the first place, Dr. Demme maintains that he is firmly convinced that, in children, febrile affections, with moderate fever, from 100° to 101° F., are best treated without any antipyretics whatever in the way of therapeutics, and that the febrile symptoms may be best controlled by cloths wet in cold water and wrapped around the trunk. His experience, he states, has taught him that such moderate febrile temperatures, with the accompanying nervous excitement and restlessness and the insomnia, or still more alarming profound somnolence, can be more satisfactorily overcome by baths of from five to ten minutes' duration each, administered twice daily, the temperature of the water being from 79° to 82½° F. When, however, the temperature reaches 104°, and remains at this elevation, then antipyretics are necessary, although the author shows that there is the greatest choice in the selection of a suitable remedy for this purpose. Regard must not only be paid to the elevation of temperature alone, but also the character of the morbid process and the condition of the patient's strength must come into consideration. His experience, he states, has taught him that typhoid fever, acute articular rheumatism, and broncho-pneumonia of asthenic type best respond to the antipyretic therapeutics. He rarely, however, employs them, or only exceptionally when compelled to, in diphtheria, in the acute exanthemata, such as scarlet fever and measles, and in simple croupous pneumonia. What was said above as to the employment of baths alone applies also to the combined employment of antipyretic drugs and baths. He only recommends the employment of baths when the temperature of the body is reduced during its administration in extremely rare cases and only when there is an alarmingly high temperature. In the large majority of cases, lukewarm baths, of the temperature above referred to, more or less prolonged in administration, will give much more satisfactory results. In cases where the soporific symptoms are especially marked, and where there is deep red or light cyanotic color in the face, lukewarm baths may be used, and are better taken at about 40° F., poured over the head and neck. As regards the selection of the individual antipyretics, in addition to the general observations already given in every case of acute articular rheumatism, when the condition of the digestive organs permit it, he uses the salicylate of sodium, or, where there is a tendency to vomiting or diarrhœa, or serious objection to the taste, he substitutes for it salol. Of the salicylate of sodium, the following are the doses to be administered in twenty-four hours: For children from 2 to 4 years of age, 7½ to 15 grains; for children from 5 to 10 years of age, 15 to 30 grains; for children from 11 to 15 years of age, 30 to 45 grains. The following are the doses recommended of salol: For children from 2 to 4 years of age, three times daily, a powder of 4 to 5 grains; for children from 5 to 10 years, three to four times daily, a powder of from 7½ to 12 grains; for children from 11 to 15 years of age, three to four times daily, a powder of 12 to 15 grains; and in typhoid fever he has found the greatest satisfaction upon the employment of thallin, administered in the form of a sulphate, giving it every two hours to children from 3 to 4 years of age in doses of 1/6 grain; from 5 to 10 years of age, in doses of 1/3 grain; 11 to 15 years of age, in doses of ½ to ⅞ grain. In cases of broncho-pneumonia, where the temperature may often reach 106°, antipyrin is the remedy which Dr. Demme recommends, giving it dissolved in large quantities of water, with the addition of a little sugar and a few drops of brandy. In this mode of administration he claims that disturbances of the appetite or vomiting will be entirely avoided. He states that this remedy has rarely failed to give him satisfactory results where he has attempted to produce marked reduction of temperature, notwith-

standing cases of broncho-pneumonia, or in the acute exanthemata, or even in malignant diphtheria, and he consequently prefers it to any one of the other antipyretics. He recommends the following doses, to be taken at hourly intervals: For children of from 2 to 4 years of age, 3 to 6 grains; from 5 to 10 years of age, 7 to 12 grains; 11 to 15 years of age, 13 to 15 grains. Of course, when the antipyretic effect commences, this dose must be diminished, while larger doses are, according to the author, never required. In cases of broncho-pneumonia in children, where hectic fever sets in, with high evening exacerbations and morning remissions, antipyrin, or any of the aromatic order of antipyretics, will be of value. The dose which he then administers is, for children from 11 to 15 years of age, 12 to 15 grains; although the author, as seen, gives the preference to antipyrin as an antipyretic, he nevertheless refers to acetanilide and antifebrin as likewise, in cases of erysipelas and acute rheumatism and pulmonary tuberculosis, satisfactory antipyretics, while antifebrin possesses the advantage over antipyrin in more seldom leading to the production of exanthematous eruption.

SPERMINE AND PIPERAZIDIN.

In June, 1889, Brown-Séquard made the statement before the Société de Biologie of Paris that extracts from the testicles of young animals, when subcutaneously injected, produced marked stimulating effects upon the nervous system, supporting his statement by the report of experiments made on animals and observations made upon himself. The interest which these statements excited was only equalled by that caused by the recent claims of Koch, and although Brown-Séquard's conclusions, perhaps exaggerated as much as Koch's, were confirmed by a very large number of observers, they have now passed, we might almost say, into obscurity.

We have on a previous occasion published an account of the investigations conducted by Messrs. Parke, Davis & Co. as to the properties of spermine, which it was suggested to substitute for the testicular extract; while Poehl, in St. Petersburg, has recently made and published a study of the physiological action and therapeutic application of this substance.

Spermine is an organic base, whose phosphate forms crystalline salts, which were first recognized in 1853 by Charcot and Robin in the spleen in cases of leukæmia, and were hence called Charcot's crystals. Later Förster and Hartung recognized these crystals in bronchitic sputum, while Charcot and Vulpian found them in the blood in leukæmia; Wagner detected them in the portal blood of an anæmic woman; and Böttcher discovered them in dried human semen. Neumann also discovered them in the spinal marrow in leukæmia, and in the normal condition, in nearly all bodies examined for this purpose.

Schreiner, in 1878, prepared the crystals from semen, from calf's liver, the calf's heart, and the testicles of the bull, and recognized in the phosphoric salt a new organic base, to which analysis gave the formula of C_2H_5N. In 1888, Ladenburg and Abel, by heating muriate of æthylendiamin, obtained in small amounts a body to which the name of æthylenimin, with a formula of C_2H_4NH, was given, a substance in all probability identical with Schreiner's base.

The physiological action of this base, discovered by Schreiner, or spermine, was studied by Kobert a long time time before Brown-Séquard's experiments, and recognized by him as not poisonous. Recently, PROFESSOR TARCHANOW made a number of experiments with the spermine prepared by Professor Poehl from the testicles and prostatic glands of young bulls and stallions, and his observations are published in the *Therapeutische Monatshefte* for January, 1891. He observed that after injection into the blood there was slowing of the pulse, with increased vigor of the heart's contraction, elevation in the pulse wave, and marked reduction of blood pressure. Under his directions a number of experiments were made by different observers on sterilized one and two per cent. solutions of the hydrochlorate of spermine, and its stimulating activity on the central apparatus was more or less confirmed. Kobert, however, maintains that these conclusions are not substantiated, for, in diseases where spermine is present in increased quantity, the specific action of spermine is nearly always absent, and only one such case has been reported where such a patient suffered from marked priapism. Recently still another preparation has been placed on the market, at first under the name of "spermin," later under the designation of "piperazidin." This substance occurs in colorless crystals, readily soluble in water, possessing no caustic properties, and forms readily soluble crystalline salts with hydrochloric acid. It seems from chemical examination that this body is absolutely identical with Schreiner's base, and Dr. Hoffmann, after subjecting it to chemical

analysis, recognizes it as diathylendiamin, with the formula—

$$C_2H_4<^{NH}_{NH}>C_2H_4.$$

Yet the properties of this body vary in such a degree from those of æthylenimin that it can scarcely be conceived that the two bodies are identical, though Dr. Hoffmann writes that he has not yet been able to compare piperazidin with Schreiner's base.

Dr. Bock has made a few experiments on animals in the Berlin Pharmacological Institute with this substance, piperazidin, and states that in no instance did he succeed in obtaining any evidence of any stimulating properties whatever. On a few occasions in the rabbit, after subcutaneous injections, there was a slight transient acceleration of the pulse, which might, however, with probability, be attributed to the operative procedure itself. There was never any increase of blood-pressure. If, however, large doses—7½ grains or more—were injected into the veins, there was temporary depression of blood-pressure, which, however, soon regained the original height, and is no evidence of any special action. The results deviate in the most marked degree, therefore, from the conclusions drawn by Tarchanow with the spermine prepared by Poehl. So, also, as to its general stimulating properties, the author's experiments failed to furnish any affirmative evidence.

There is a property possessed by this substance, however, that may be of therapeutic value, and that is its relation to uric acid. It is claimed that piperazidin in cold, watery solution dissolves twelve times as much uric acid as carbonate of lithium, and a combination formed of uric acid and piperazidin is seven times more soluble in water than uric acid and lithium. 1 part of uric acid and piperazidin dissolves in 50 parts of water, while uric acid lithium requires 368 parts to obtain solution. Even in great excess of uric acid, no acid salt of it is formed, but always the readily soluble neutral salt.

FERRIC BROMIDE.

Dr. Hecquet, formerly physician to the Abbeville Hospital, very strongly recommends the perbromide of iron or ferric bromide in many affections in which it is desirable to soothe without depressing, and to strengthen without exciting. Out of twenty-five cases of spermatorrhœa treated by this drug nineteen were completely cured, two only being unrelieved, and in these cases complications were present in the form of prostatic enlargement and stricture of long standing. The perbromide was frequently found useful in cases of chloro-anæmia, leucorrhœa, hysteria, amenorrhœa, hydræmia of pregnancy, chorea, epilepsy, diabetes, and tuberculosis. In conjunction with Dr. Vacossin a series of trials were made in the Abbeville Hospital on its action in cases of cardiac hypertrophy, with the result that Magendie's observations, made more than fifty years ago, were confirmed, the patients being strengthened and relieved by the calming of the palpitation and of the dyspnœa. This combination is well borne, even by irritable stomachs. It may be taken in solution, or in lozenges, the dose being from 3 to 5 grains. The action is more rapid than that of most iron compounds, as its good effects begin to manifest themselves in cases of chlorosis during the first week of administration, a complete cure being generally obtained in a month. Dr. Hecquet has found by experience that the ferric salt Fe_2Br_6 acts both more rapidly and gives more permanent results than the ferrous salt $FeBr_2$, and hence he has latterly confined himself to prescribing the former, which he does not hesitate to say is endowed with exceptionally valuable properties, and deserves to be far better known and more employed than it has hitherto been. There is a preparation of the ferrous salt in the Pharmacopœia of the British Pharmaceutical Conference, which, however, is not very largely prescribed. No preparation of the ferric salt seems to be known in this country. —*Lancet*, February 14, 1891.

PERMANENT SLOW PULSE.

At the meeting of the Société Médicale des Hôpitaux, held February 6, 1891, a number of instances of abnormally slow pulse were reported (*La Tribune Médicale*, February 19, 1891). Dr. Comby reported the case of a woman who, without any hereditary defect, suffered two years ago with frequent attacks of vertigo. In July, 1890, œdema of the legs occurred, and it was then found that the pulse was but 38 in a minute. There was intense dyspnœa, with violent paroxysmal crises. The radial arteries were not atheromatous, there was no intermittence, no irregularity, and no enlargement of the heart with the exception that the heart was dilated at its apex in the sixth interspace, there was

emphysema without bronchitis, nothing else abnormal was detectable. Bromide of potassium was administered for eight days, in the dose of 30 to 60 grains, without producing amelioration. Caffeine was then given, in the dose of 15 grains, injected subcutaneously. On the 20th of January the patient was placed on exclusive milk diet. There was increase of the amount of urine passed, and diminution in the frequency and intensity of the attacks of dyspnœa, the pulse, nevertheless, remained at 32. The author attributes the attacks of vertigo and dyspnœa to a uræmic origin.

DR. HUCHARD stated that he had observed six cases of permanent slow pulse; one occurred in a man 34 years of age, who suffered from angina pectoris, vertigo, and loss of consciousness. Ordinarily his pulse was 80 in a minute, but on the approach of these attacks of loss of consciousness it fell to 50, 40, or 30, finally being permanently slowed. Then after a while the urine was found to contain albumen, and the patient finally died suddenly with symptoms of uræmia.

He believes that the syncope and the epileptiform attacks, as well as the slow pulse, are probably due to ischæmia of the medulla oblongata, and that the dyspnœa, albuminuria, cardiac, and renal symptoms are attributable to arterial sclerosis. From a therapeutic point of view he believes there are three points to be met with.

First.—To combat the medullary ischæmia with nitroglycerin, 8, 10, or 12 drops, with nitrite of amyl in the violent attacks of dyspnœa.

Second.—To renew the power of the heart, not by digitalis, which is contraindicated, but by caffeine, coffee, or tea.

Third.—To prevent renal accidents, or to combat them by milk diet.

DR. CHANTEMESSE also stated that he had observed a case of permanent slow pulse, with epileptiform convulsions and albuminuria. At the autopsy, general atheromatous lesions were found, although there was no atheroma of the medullary arteries.

DR. LAVERAN stated that he had also had under his care a patient suffering from permanent slowed pulse, although the urine contained no albumen. Nux vomica relieved the accompanying symptoms, but without any modification of the pulse.

DR. RENDU stated that among the patients who presented permanent slow pulse some few have cardiac defects, others renal defects, others atheromatous, but all are not uræmic, and he stated that he had under his care for the last three months a patient who had never had the least evidence of disease, and in whom the pulse normally seemed to beat only 16 to 18 times a minute. Nothing seemed able to modify this rate, neither coffee, tea, oxygen, climbing, or horseback-riding. He was unwilling to admit that uræmia was latent, and believed that permanent slow pulse might be attributed to numerous causes.

THE ACTION OF ANTISEPTICS ON THE PERITONEUM.

DRS. DELBET, GRAND'MAISON, and BRENET (*Annales de Gynécol.*, January, 1891) announce the result of a series of experiments performed to ascertain the action of antiseptics upon the peritoneum. They admit that there are certain disadvantages in the use of antiseptics. In the resistance of a healthy system to micro-organisms, cells play an active part. All antiseptics are poisons to bacilli, and if poisonous to these simple unicellular organisms, they are also poisonous to the highly complicated multicellular tissues in the human body. If, then, any antiseptic kills bacilli, it must also destroy some of the cells belonging to the patient's body which it touches. The destruction of these cells diminishes the resisting power of the subjacent tissues, and should the antiseptic have failed to kill all the bacilli in the neighborhood, some of the surviving germs may enter the unprotected tissues. In the case of superficial wounds dressed with antiseptics, the good done by germ destruction must greatly exceed the harm caused by damage to connective-tissue cells, which have feeble resisting powers against bacilli; on the other hand, the peritoneal endothelium is now known to resist the incursion of germs with great vigor as long as it is healthy and uninjured. Larnelle never succeeded in finding a single bacillus within the substance of a peritoneal endothelial cell. Possibly these cells secrete a substance which poisons bacilli. When the endothelium of an area of the peritoneum is damaged or destroyed, the resisting power of that serous membrane is greatly impaired. The common connective tissue cannot offer adequate protection to the system. May not antiseptics destroy the endothelium, or, at least, set up grave changes, impairing its resisting powers? To settle this question, Drs. Delbet and his colleagues have undertaken the experiments which they now describe.

Their method consists in carefully touching up a tract of mesentery in a dog with an antiseptic, and then flushing the peritoneum. Another tract is treated in the same way, and the peritoneal cavity is once more washed out. At the end of a stated time the animal is killed. With manifold precautions pieces of the mesentery treated with the antiseptic are removed and compared with other portions not so treated. The endothelium was stained with nitrate of silver. The nuclei seemed unaffected, but the protoplasm underwent great changes. The first modification was a retraction of the endothelial cells at their pointed prominences. Hence little black spots appeared where the meshes of the well-known net-work pattern, formed by contiguous endothelial cells, crossed each other. This "angular retraction" passed into "angulo-marginal retraction." Black points appeared at first along each mesh, indicating partial separation of the margins of contiguous cells. When the separation was complete, the meshes looked unusually thick. The next stage is "fragmentation," the protoplasm becoming granular and breaking up. Partial, and lastly complete, desquamation follows. The above stages are produced more rapidly or slowly according to the power and nature of the antiseptic, some agents causing desquamation at once. In any case the endothelium, a bulwark against sepsis, is distinctly damaged.—*British Medical Journal*, February 21, 1891.

THE CONDENSATION OF INFANTS' FOOD.

None of the excellent formulæ which physicians have devised for feeding in rearing infants can claim to provide the article which is most convenient for unskilled use, and these plans are, therefore, adopted only when the child has fallen ill and is under medical advice. Prevention is undoubtedly better than cure, and if any impression is to be made upon the present mortality of hand-fed children, it must be through taking account of the convenience of their attendants, so that what is most approved of by the profession may also be that which from the outset is naturally adopted.

The custom of condensing milk is that which naturally suggests itself, especially since condensation assists sterilization, which has been shown to be desirable, and a uniform article is also furnished and an opportunity afforded for adding those ingredients which are considered necessary in a substitute for human milk. The more expensive milks, such as that of the ass, might be treated by this process; but for the present it is sufficient to consider only that of the cow, and a paper published by MR. J. B. NIAS, in the *Practitioner* for January, 1891, offers many practical points of interest.

Accuracy requires that fat should be added to cow's milk. This must practically be in the form of cream, which is expensive, and, until very recent years, has been obtained from milk that has more or less soured. Some advisers have endeavored to evade this necessity by adopting, as their basis, analyses which support the contention that cow's milk of itself contains enough fat for an infant's food; but this proposition is difficult to support by modern standards, while the invention of the separator, and the method of condensing milk, render it no longer necessary.

The uniformity of cow's milk has no parallel in that of the human species. It is not every specimen of the latter which is fit to nourish a child. A good standard is, consequently, all important for the preparation of a substitute. The analysis most generally used by medical men is that furnished by Vernois and Becquerel, presumably because it is based on the imposing number of eighty-nine individuals; but a study of their memoir will lead to the conclusion that a great deal of industry was uselessly applied, and that their results are not so valuable as many others that were obtained from less extensive data. Briefly, these experimenters did not completely dry their solids, extracted the fat imperfectly, estimated the sugar in an impure solution by the polariscope, and calculated the casein by difference only; with the result that the casein is put too high, and the fat and sugar too low. These faults were at once exposed by Poggiale. If the analysis of cow's milk given by these authors is also used, their errors are for our purpose neutralized; but this is not generally done. Whatever standard be used, it should be modern, and, as an example, the author transcribes three, and appends some calculations based upon them. It must be understood, however, that these are not to be accepted implicitly, but merely as indications of the method to be followed for the end in view. The following is given as the percentage composition of human milk by

	Proteids.	Fat.	Sugar.	Salts (ash).	Water.
Foster.....	2.0	2.75	5.0	.25	90 0
Blyth.....	3.0	2.90	5.87	.16	88.2
Church.....	1.8	4.0	7.0	.3	86.7
V. and B....	3.9	2.6	4.3	.13	88.9

and cow's milk—

	Proteids.	Fat.	Sugar.	Salts (ash.)	Water.
Foster.....	4.3	4.0	4.4	.6	87.0
Blyth.....	4.75	3.5	4.0	.7	87.0
Church.....	3.4	3.8	5 0	.8	87.0
V. and B....	5.5	3.6	3.8	.6	86.4

The quantity of food taken by an infant should, like that of an adult, bear some ratio to its weight. Setting the total absence of exertion against the rapid growth, it may be assumed that an infant will take, like an adult, at least $\frac{1}{100}$ part of its body-weight in solids per diem; and also, for convenience in calculation, it may be assumed that an infant will weigh at birth 8¼ pounds, and will increase pretty regularly to 25 pounds at 12 months old. At this age, in this country, weaning usually begins. If, again, the solids of human milk be taken at ten per cent., and a pint at sp. gr. 1031 to weigh 9000 grains, a pint will yield $2\frac{1}{12}$ ounces avoirdupois of solids. From this it may be inferred that an infant at birth will require ⅔ pint, and at 12 months old 2 pints, of its mother's milk, which, for a minimum, is in accordance with most estimates. When we deal with these quantities, the exact percentage of the ingredients becomes important. When the fat is taken as oil of specific gravity 920, 50 grains will fill a teaspoonful, so that the quantity required at birth is 3 to 4 teaspoonfuls, and at 12 months old 3 to 4 tablespoonfuls at the least. The great question in substituting cow's milk for human milk is, Shall the fat be sufficient and the casein in excess? Because we must have one or the other. Sugar is but an imperfect substitute for fat, and cream, as generally used, has its drawbacks. The mortality of hand-fed children being greater than of those at the breast, we have still a great deal to make up in our efforts at rearing; it is, therefore, worth while to scrutinize this question closely.

The ejection of large curds from the stomach by vomiting the author regards rather as evidence of atony and deficient peristalsis of the stomach than of simple irritation of the mucous membrane, so that this condition of the ejection of large undigested masses need not necessarily be put down as attributable to the quality of the food,—that is, the indigestibility of cow's milk, but should be attributed to the quantity, for the excess of which vomiting is the natural remedy. Again, as we know by the example of cheese that curd is more digestible when it contains abundance of fat, the most irritating and indigestible curd will be that precipitated from skimmed milk, or milk much diluted with water. Before turning, then, to peptones and other albuminous substances, it is reasonable to try the effect of a good rich quality of cow's milk in exactly the right quantity and properly diluted. Again, it should be remembered that the yield of the human breast and the capacity of the child's stomach correspond, 5 fluidounces being the most that can be secreted or taken at one time. It is curious that feeding-bottles are rarely graduated, and the medical attendant should not be above doing it himself on occasion. So much as regards indigestion. Next, as to quantity.

If care is taken, the casein of cow's milk will not prove troublesome, and the author does not believe in the advantage of substituting vegetable for animal proteids, the gluten of flour in particular. Egg albumen, he thinks, is somewhat better, and part of the yelk of an egg added to highly-diluted milk will often render it tolerated. As the weight of the yelk of an egg is nearly three hundred grains, it will furnish the requisite solids to more than a pint of milk, so that discredit can be brought on this article also by its excessive use.

Taking the above three analyses of Foster, Blyth, and Church, it will be found that the quantity of cow's milk to be given to a child at birth (diluted with water to make up ⅔ pint) will be 7, 9, and 11 fluidounces, respectively, if the quantities of casein are to be rendered equal; and 9, 11, and 14 fluidounces if the fat is to be rendered equal; giving, in the one case, deficiencies of 45, 41, and 123 grains of fat, and, in the other, excesses of 81, 86, and 100 grains of casein. And to equal the quantity required, of 2 pints, at 12 months old, we must take of cow's milk, 1, 1⅓, and 2 pints, respectively, if we wish to equalize the casein, which will give a deficiency of 135, 124, or 369 grains of fat; or, for equal quantities of fat, we must give 1⅓, 1⅝, or 2 pints of cow's milk respectively, with excesses of 243, 264, or 300 grains of casein. Every one can appreciate these figures; and similar calculations have led others to the recommendation of cream, whenever practicable, which is but seldom, the previous acidulation of the milk rendering it unwholesome. The daily quantity required runs from a teaspoonful at birth to a tablespoonful at 12 months old. With the use of a separator and tinned preparations, the addition is feasible and very desirable.

The addition of sugar presents no difficulty. As to the salts of milk, the published analyses are mostly very old, and are copied from one work to another in a surprising way. The most important point to note is that, in a daily allowance of 1⅓ pints of cow's milk, there will be an excess of about 7 grains of potassium

chloride and a deficiency of 8 grains of calcium phosphate. The solution of calcium phosphate in milk is a difficult problem. The clearest possible correspondence in the salts should be aimed at, because they have some relation to the casein, and determine the flavor of the milk, which, as remarked before, is as important with the food of an infant as with that of an adult. Doubtless much indigestion in the infant can be put down to the want of flavor in its food, for which reason carminatives and stimulants give the relief which they do with improper diet.

The sum of the foregoing is, that it would be a step in advance to introduce a condensed cow's milk, with the addition of ¼ to ⅓ of the natural fat, and not more than 1¼ to 1½ times the natural sugar, and such salts as may be found possible and desirable. How far this would keep without additional sugar can only be tried.

Quantity is, however, the most important point, and the mishaps which happen with infant feeding are more often due to the manner than to the material. As little should be left to discretion as possible. The supply of mother's milk is limited and regular, that of the substitute may be neither. Directions, therefore, should be more precise, and a teaspoonful of condensed milk first taken from the pint, and the surplus allowed to run off, will average 200 grains. These milks generally require about five times their weight of water to give about two and a half per cent. of casein, and the above teaspoonful thus would be 2½ fluidounces or by measure 1 to 20.

It is of advantage to be able to analyze in some ready way the milk which a child is taking. If it be boiled in a test-tube with a few drops of liquor potassæ or sodæ, and the tube plugged with cotton-wool and allowed to stand, the fat will rise almost completely to the top, and may be assisted to do so with a little ether or benzine. The underlying fluid can be tested by the microscope, or by drying on a piece of paper for fat; the separation is usually pretty complete. The proteids can afterwards be precipitated by any usual method, and estimated, as in urine. This method appears rough, but is sufficient to show what is wrong with the food. Too much water and too little fat are the most frequent defects, and are easily remedied. It is a great mistake to wait for the appearance of rickets before giving an infant its proper physiological ration of fat. Cream, cod-liver oil, yolk of egg, or suet boiled in the milk are preventives of numerous maladies for them; but they are seldom thought of till too late.

Reviews.

SAUNDERS'S QUESTION COMPENDS, No. 2. ESSENTIALS OF SURGERY. By Edward Martin, A.M., M.D., Instructor in Operative Surgery, University of Pennsylvania, and Assistant Surgeon to the Hospital of the same; Surgeon to Howard Hospital. Fourth edition.

Philadelphia: W. B. Saunders, 1891.

That Dr. Martin's admirable compend upon surgery has proved its sterling worth to students, both in this city and elsewhere throughout the country, is readily recognized, when we consider that only two years have elapsed since the book made its appearance. In that short interval its popularity has exhausted three large editions, so that the volume before us is the fourth revision.

The original form of the book, giving question and answer, with the arrangement of topics, is the same as in its former editions, but in numerous places the answers are given somewhat more in detail, and here and there new matter is introduced in keeping with the many recent advances in surgery. The appendix, which is entirely new, comprises several hundred selected and standard prescriptions applicable to the treatment of all sorts of surgical affections, together with very full directions for the preparation of the various dressings, solutions, and ointments used in antiseptic surgical procedures. The list of diseases here treated of is arranged alphabetically, and all the appropriate formulæ are thus readily obtained by simply turning to the required disease. The plates illustrating and elaborating the text are both numerous and very cleverly executed. The book, in its present form, we feel certain, will be a most valuable aid to the busy practitioner, as well as to the student preparing for examination. W. D. G.

A DICTIONARY OF PRACTICAL MEDICINE. By various writers. Edited by James Kingston Fowler, M.A., M.D., etc.

Philadelphia: P. Blakiston, Son & Co., 1012 Walnut Street, 1890.

Some men learn about all they know of progressive medicine from condensation. In the hurry of life, anything which will save time is worth owning, the only trouble being that the same hurry that threatens to outstrip the reader leaves behind it a waste and wreck of epitomes, abstracts, dictionaries, encyclopædias, so that the one to read and consult,

if we would save our moments, is the last and freshest.

The contributors give the rank to a book of this sort. Abercrombie, Carter, Cayley, Coupland, Cruikshank, Horsley, Money, and many more names familiar with permanent and evanescent British medical literature are on the list, and a somewhat extended reading of the book convinces us that its claims to recognition as a medical dictionary safe to consult, as being abreast of the time, are warranted by its contents.

E. W. W.

THE PHYSICIANS' AND STUDENTS' READY REFERENCE SERIES, No. 5. ELECTRICITY IN THE DISEASES OF WOMEN, WITH SPECIAL REFERENCE TO THE APPLICATION OF STRONG CURRENTS. By G. Betton Massey, M.D., etc. Second edition. Revised and enlarged.

Philadelphia and London: F. A. Davis, 1890.

Those who read with interest Dr. Massey's first edition, and perceived the exhaustive character of the work, will be glad to find it carried still further in the present volume. While the value of electricity is still under dispute in the class of cases in which Dr. Massey applies it, there is all the more reason for a careful hearing of the claims of each earnest investigator. The chapters on "Chronic Inflammatory Diseases of the Appendages" are the centre of interest at present, and in this question of electricity *versus* operation are sure of being carefully weighed and discussed by the great jury of the active medical world. E. W. W.

MASSOTHERAPEUTICS; OR, MASSAGE AS A MODE OF TREATMENT. By Wm. Murrell, M.D., F.R.C.P., etc. Fifth edition.

Philadelphia: P. Blakiston, Son & Co., 1890.

This horrible name vainly strives to conceal the sterling merits of Dr. Murrell's work. The author himself feels called upon to extenuate it, and argues its claims as indicating something more, as a title, than massage. Massotherapeutics, he says, meaning massage, in a scientific aspect, as a therapeutic agent, and not merely a means of earning a living or keeping a "modified form of hotel." To the words of praise which we have been disposed to give this book in reviews of the earlier editions, we can only add that the present one contains some new matter and new illustrations. Of its great value to the conscientious searcher for new therapeutics we are as confident as ever. E. W. W.

Correspondence.

BERLIN.

(From our Special Correspondent.)

The latest publications concerning the Koch treatment of tuberculosis report great success in the majority of cases. Experimenters now begin treatment with very small injections, say one decimilligramme, and slowly and carefully increase the dose. By this means the febrile reaction and the unpleasant complications are avoided, or, at least, decreased, and the patient can finally stand very large doses. More favorable reports are also being received from foreign countries. In Holland, for instance, at first the treatment was very severely criticised, while now it is quite highly praised. It seems settled, as Koch claimed, though many experimenters have forgotten it, that the treatment is mainly suited to cases of beginning phthisis. Virchow's papers, showing the anatomical changes that, in certain conditions, the remedy may cause, have been of great advantage both to the method and to suffering humanity.

In the mean while, Professor Liebreich has announced a new remedy for tuberculosis,—namely, the potassium and sodium salts of cantharidic acid. He regards it as especially useful in laryngeal affections. It is used hypodermically in doses of from 1 to 4 decimilligrammes. So far experiments with it have resulted favorably. Its effects in pulmonary phthisis and tuberculosis of the skin have not as yet been accurately determined. It has acted excellently in simple laryngeal catarrh, and has also been employed in diseases of the eye, diphtheria, etc.,—*i.e.*, in processes in which thick transudations and hardening of the tissues occur. The subject deserves thorough investigation.

The great increase in the use of the hypodermic method of exhibiting medicines has led to improvements in the instrument. When strict accuracy in measurement is required, as, for instance, in the Koch treatment, the Pravaz syringe is useless, since oftentimes the cylinder contains one and a half instead of one gramme, and the scale is incorrect. In the Koch syringe, in which suction and expression are produced by a rubber ball, there are also many disadvantages. Dr. Geo. Meyer, of Berlin, has invented a new instrument, made by H. Windler, Doroteen Strasse 3, which is believed to be without fault. Its

advantages are that the liquid cannot come in contact with metal, and so oxidation, etc., are avoided. The instrument can be easily and quickly taken apart, cleaned, and disinfected. It is quickly prepared for use by moistening the asbestos head of the piston. It is especially adapted to disinfection by absolute alcohol, which is so strongly recommended by Koch.

It is stated that soon one or two new methods of treatment of tuberculosis will be published. Who the authors are is not yet known with certainty. The future alone will show which method is best adapted to individual cases, though certainly so far much may be said in just praise of Oscar Liebreich.

During the Koch discussion an important point, deserving consideration, has arisen,—namely, the employment of fat in surgical tuberculosis. Dr. Schleich recommends it highly. He has noticed in a great number of cases that the tuberculous granulations completely disappear if the wounds be thoroughly covered with fat, vaseline, etc. This led him to the thought that in many infectious diseases the mechanism of the taking up of micro-organisms by the leucocytes sufficed to explain the curative influence of various agents. Restoration of cells and avoidance of injury to the tissue is especially to be regarded. If, now, the leucocytes can be increased in the tissue itself, without the latter being affected, certainly the diseased condition will be altered for the better. The remedy must be taken up by the leucocytes in the same manner as bacilli are. As regards fat, this process can be followed under the microscope. It is interesting that among the people fat has long been used, and successfully, as a remedy against phthisis. As we all know, physicians have long used cod-liver oil. Further, tuberculosis is principally found in tissues poor in fat,—the lungs, serous cavities, kidney, and liver; while tissues rich in fat—for example, the subcutaneous tissue—are seldom the seat of this disease. Pure fat, in form of olive oil, has lately proven to be a useful remedy. Siegfried Rosenberg, following the example of many foreign physicians, has used it with much success in cases of gall-stone. He also justifies its use from experimental studies concerning its influence on the secretion of gall and on digestion. Shortly after the exhibition of large doses, the calculi are passed and the patient relieved. Very recently Senator has spoken very highly of lipanin, and has used it instead of oil. Unlike cod-liver oil, it does not in any case interfere with digestion.

BERLIN, March 17, 1891.

Notes and Queries.

A NEW FATTY ACID IN COW'S BUTTER.

It has long been known that the acids arising from the saponification of butter include small proportions of butyric, caproic caprylic, and rutic acids. The larger proportion of the acids has, up to the present time, been held to consist of palmitic, oleic, and stearic acids, which are non-volatile and insoluble in water. In a paper published in the *Lancet* for February 14, 1891, J. ALFRED WANKLYN announces that he has discovered that the main acid is not palmitic acid, but an acid quite distinct from palmitic acid, both in composition and properties.

This new acid, which is so abundant as to amount to about half of the weight of the dry butter, differs from palmitic acid by containing less hydrogen, its formula being $(C_{16}H_{30}O_2)n$. The melting-point of the new acid is about 50° C., whereas palmitic melts at 62° C. The new acid possesses the extraordinary property of consolidating or gelatinizing alcohol. At temperatures below 5° C. it gelatinizes more than five times its weight of alcohol. Part of the alcohol is held mechanically by a sponge-like action, and part is retained in chemical combination. Palmitic acid possesses no such property, nor does any other substance resemble this new acid in this particular.

PHOTOGRAPHING IN COLORS.

The invention which has recently been announced from Paris, of a method of communicating color to a sensitive photographic film by the action of a ray of colored light, will, if confirmed, awaken very wide-spread interest, for it is impossible to foresee all the applications to which such a discovery might be expected eventually to lend itself. The idea is credited to M. Lipmann, a professor of the Sorbonne and a physicist whose name is already widely and favorably known in connection with some highly ingenious instruments of physical research. The theory

which he is said to have successfully embodied in experiment is that the interference of two rays of light of the same wave-length may be caused to produce a characteristic effect upon a sensitive film, such as amounts to dyeing the film of the particular hue in question. So far as has at present been explained, the process appears to depend upon the doctrine that the chemical action, like the chromatic properties, of a ray of light is capable of being affected by the conditions which give rise to the phenomena of interference. In itself this seems likely enough. It is well known that if two rays of light having the same wave-length travel along the same path simultaneously, they interfere with one another. It may and does happen that at certain points along the path, depending for their position on the wave-length; the two impulses tend to counteract, and at other points to reinforce one another. A luminiferous particle—whatever that may be—which is acted upon by two opposing forces will remain at rest if the forces are equal as well as opposite; while if the forces be not equal or not directly opposed, there will be some resulting disturbance, but still a disturbance different from that which would have been produced by either of the co-incident forces acting alone. From this cause arise all those beautiful optical effects of interference which so strikingly illustrate the undulatory theory of light. Now, if it be a fact that the chemical activity of a ray of light is subject to the same law, and can be either exalted or depressed by causing a second ray of the same wave-length to act upon the sensitive reagent, it is quite conceivable that a pair of rays of light might be so directed through a photographic film as to cause not a uniform, but a sporadic deposit of the precipitated element. These minute deposits would in that case be distributed at definite distances apart along the line of the common path of the active rays, because they would mark the points of co-operating, and therefore exalted activity. Similarly, their intervals would occupy the spaces in which the antagonism of the two rays had reduced or even destroyed the actinic effect. Now such a film would apparently be opaque to any light not having this particular wave-length, because at some point it would necessarily be absorbed by the opaque deposit. But if a ray of the same wave-length impinged, it might be able to pick its way successfully between the deposits. Professor Lippmann is said to have produced such a film by the expedient of placing a mirror at the back of his sensitive plate, and causing the focused ray to return along its own path. The mirror is produced by making the plate one side of a mercury-trough, which when filled constitutes a mirror in exactly the desired position. The expedient, if successful, is certainly charmingly simple, and, seeing that the healing art would undoubtedly benefit in as high a degree as any by a practicable system of chromatic photography, we look with lively interest for some further information upon the theory and practice so ingeniously originated.—*British Medical Journal*, February 21, 1891.

URALIUM OR CHLORAL-URETHAN.

Uralium or chloral-urethan, which was very strongly recommended early last year by Dr. Poppi, of Bologna, as being a better hypnotic for insane and neurotic patients than most other drugs of this class, has recently been carefully tested by MM. SCHMITT and PARISOT, of Nancy, who administered it in an alcoholic solution in a variety of cases where the patient suffered from insomnia. The smallest dose that was at all effectual was 15 grains, but doses of even 38 grains were by no means always successful; indeed, less so than chloral or opium. Added to the uncertainty of its effects, it was very disagreeable to take, and often disordered the digestion, and sometimes caused vomiting, followed by nausea, which lasted for some days. In two cases, too, vertigo was complained of. It would seem, therefore, that Dr. Poppi's good opinion of uralium is not shared by the French observers.—*Lancet*, January 10, 1891.

TREATMENT OF THE ALGID STAGE OF CHOLERA.

In the Fiume Hospital the method by which the algid stage of cholera was treated during the last epidemic was by giving gum ammoniac internally, together with stimulants, and injecting sulphuric ether hypodermically. According to DR. RITTER VON GIACICH, the director of the hospital, this plan, which was always adopted, proved most successful, a great improvement taking place

in fifty per cent. of the cases in a couple of hours' time. This made itself manifest not only by a rise of temperature and a stronger pulse, but also by the expression of the face becoming less pinched and anxious, after which the patient made good progress towards convalescence. Warm baths were often administered with advantage. Where three hours elapsed after the treatment above mentioned, without manifest improvement, the case always proved fatal.—*Lancet*, November 1, 1890.

OFFICIAL REPORT ON KOCH'S TREATMENT.

The following are tabulated conclusions of the results of the observations made by the various professors and chiefs of clinics in the different Prussian universities with Koch's remedy for tuberculosis. Nearly sixty reports in all are included in this volume, and, as might be expected, they are of very unequal value, some being so scanty and containing so little accurate information that they might with advantage have been entirely omitted. One of the most striking points in the character of these reports is the great variations in the methods employed by different observers, some only employing three injections, while others administered as many as eighteen or nineteen to each patient, so that these sets of cases should be put on very different footings, and the conclusion is still further substantiated that it is as yet impossible to give any definite opinion on the value of the method, principally because sufficient time has not yet elapsed to establish the permanence of the so-called cures.—*British Medical Journal*, March 14, 1891.

TABLE I.—*Statistical Statement of the Action of Koch's Fluid in Tuberculosis of Internal Organs.*

Diseases.	No. of cases treated.	Cured.	Substantially improved.	Improved.	Unimproved.	Died.
I.—PULMONARY TUBERCULOSIS:						
1. Early pulmonary phthisis	242	9	72	59	93	0
(*a*) With laryngeal tuberculosis	30	0	10	6	13	0
(*b*) With tuberculosis of other internal organs	7	0	1	2	4	0
(*c*) With other diseases	8	0	0	1	6	0
2. Moderately-advanced pulmonary phthisis	444	1	68	68	278	6
(*a*) With laryngeal tuberculosis	85	1	10	11	37	2
(*b*) With tuberculosis of other internal organs	15	0	1	4	5	2
(*c*) With other diseases	14	0	0	0	7	2
3. Very advanced pulmonary phthisis (cavities)	246	0	7	31	162	30
(*a*) With laryngeal tuberculosis	60	0	1	4	45	5
(*b*) With tuberculosis of other internal organs	24	0	1	2	17	1
(*c*) With other diseases	16	0	0	1	7	5
I.—PULMONARY TUBERCULOSIS (all grades taken together)	932	10	147	158	533	36
(*a*) With laryngeal tuberculosis	175	1	21	21	95	7
(*b*) With tuberculosis of other internal organs	46	0	3	8	26	3
(*c*) With other diseases	38	0	0	2	20	7
II.—LARYNGEAL TUBERCULOSIS	63	1	18	23	15	4
With pulmonary tuberculosis	45	0	16	13	12	4
III.—PLEURISY	13	1	0	3	9	0
IV.—PERNICIOUS ANÆMIA	1	0	0	0	0	1
V.—TUBERCULOUS MENINGITIS	4	0	0	1	1	2
VI.—PERITONEAL TUBERCULOSIS	14	1	3	3	4	2
VII.—INTESTINAL TUBERCULOSIS	1	0	1	0	0	0
VIII.—RENAL TUBERCULOSIS	4	0	0	0	4	0
IX.—URETHRAL AND VESICAL TUBERCULOSIS	10	0	0	4	5	1
X.—TESTICULAR TUBERCULOSIS	18	0	2	2	14	0
XI.—DOUBLE TUBERCULOUS PYOSALPINX, with incipient pulmonary phthisis	1	0	0	0	1	0
Total	1061*	13	171	194	586	46

* The difference between the total number of cases and the number in which the result of treatment is given is due to the fact that a few reporters give no information as to the result.

TABLE II.—*Statistical Statement of the Action of Koch's Fluid in External Tuberculosis.*

Diseases.	No. of cases treated.	Cured.	Subsequently improved.	Improved.	Unimproved.	Died.
I.—LUPUS	188	5	78	84	21	0
With tuberculosis of internal organs	27	0	5	6	3	0
II.—TUBERCULOSIS OF SINGLE BONES AND JOINTS	397	9	51	119	211	6
With tuberculosis of internal organs	48	0	1	4	22	1
III.—TUBERCULOSIS OF SEVERAL BONES AND JOINTS	40	0	3	12	23	2
With tuberculosis of internal organs	10	0	0	1	7	2
IV.—TUBERCULOSIS OF LYMPH-GLANDS	38	0	9	7	22	0
With tuberculosis of internal organs	8	0	1	0	7	0
V.—TUBERCULOSIS OF SOFT PARTS	8	0	1	4	3	0
VI.—TUBERCULOSIS OF SCARS	4	0	0	3	1	0
VII.—SCROFULODERMA	6	1	2	3	0	0
VIII.—LEPRA	2	0	0	1	1	0
IX.—RODENT ULCER	2	0	0	1	1	0
X.—TUBERCULOUS ANAL FISTULA	3	0	1	0	1	1
XI.—TUBERCULOSIS OF SHEATHS OF TENDONS	1	0	1	0	0	0
XII.—SCROFULOUS ECZEMA	1	0	0	1	0	0
XIII.—SCROFULOUS KERATITIS OF BOTH EYES	2	0	2	0	0	0
XIV.—EAR-DISEASES	16	0	0	2	14	0
With pulmonary tuberculosis	7	0	0	1	6	0
Total	708	15	148	237	298	9

THE INFLUENCE OF TOBACCO ON GASTRIC DIGESTION AND ACIDITY OF THE URINE.

DR. J. YDAN-POUCHKINE reports a number of experiments which he has made in this connection on seven healthy individuals who were not habituated to tobacco-smoking, and his results are reported in the *Bulletin Général de Thérapeutique* for February 15, 1891.

He first examined the effects of tobacco on the gastric juice and the motility of the stomach and on degree of absorption and on the acidity of the urine. For three days the author examined the gastric juice and motility of the stomach, noting the degree of motion of the stomach by salol, according to the process of Ewald and the rapidity of absorption with the iodide of potassium, according to the method of Zweifel, during a second period of three days each, in which the individual smoked, respectively, twenty-five cigarettes daily. For three days after this period the author continued the examination of their gastric juice in order to determine the after-effects of the tobacco. His conclusions are embraced in the following statements:

1. Tobacco increases the quantity of gastric juice, but diminishes its acidity.

2. The quantity of free hydrochloric acid of the gastric juice is diminished under the influence of tobacco.

3. Proportionately to the decrease of the amount of hydrochloric acid there is an equal diminution of the digestive power of the gastric juice.

4. Tobacco likewise slows the action of the gastric ferments.

5. These modifications in the gastric juice produced by tobacco last for a period of several days.

6. As regards the motility of the stomach and its power of absorption, tobacco is stated to produce an increase of these functions.

7. Tobacco has no influence on the acidity of the urine.

THE PHARMACO-DYNAMICS OF PHOSPHORIC ACID.

In common with most of the officinal mineral acids, phosphoric acid is likewise attributed in therapeutic doses with a moderate power of reducing the frequency of the pulse. In the *Therapeutische Monatshefte*, DR. HUGO SCHULZ maintains that the contrary is the fact, and that so far from phosphoric acid reducing the pulse, a long series of experiments made under his direction on a number of his students have shown him that the pulse under the action of phosphoric acid becomes more rapid than it does before this drug is given.

—THE—

Therapeutic Gazette.

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Original Communications.

*A PHYSIOLOGICAL AND THERAPEUTIC STUDY OF HYDRASTIS CANADENSIS.**

By David Cerna, M.D., Ph.D.,† Philadelphia, Pa.

FROM *Hydrastis Canadensis*, or golden seal, yellow puccoon, yellow root, orange root, Indian turmeric, or Indian dye, as it is variously and commonly called, a plant belonging to the order of the Ranunculaceæ, are extracted certain active principles, not all of which have yet been fully determined.

The first observer who investigated the chemical composition of this perennial herb was Mr. Alfred A. B. Durand, of this city.‡ It was found by him to contain, besides various other substances, a peculiar nitrogenous crystallizable body, for which he proposed the provisional name of *hydrastine*, suspecting it to be, nevertheless, an alkaloid.

Later it has been ascertained that this new substance is really an alkaloid, known at present as *hydrastine*, having as synonymes *hydrastin* and *hydrastia*, and the honor of

* An essay to which the Prize, for 1890, was awarded by the Medical Society of the County of New York.

† Assistant in Physiology in the University of Pennsylvania.

‡ *Amer. Journ. of Pharm.*, 1851, p. 112.

purifying it for the first time belongs to Mr. J. Dyson Perrins, of London.*

Besides this principle, hydrastis contains, according to Rafinesque,† Kemp,‡ Fleitman,§ Mahla,‖ and Perrins,¶ a second alkaloid, called berberine, found also widely diffused in many other plants; and also a third active principle, volatile in its nature, according to the researches of H. Lerchen,** A. K. Hale,†† of Michigan, and J. C. Burt,‡‡ and generally known in these investigations as "Hale's third alkaloid." Lerchen proposed for this new substance the name of *xanthopuccine*. Recently, however, it is claimed by Professor Power,§§ that *Hydrastis Canadensis* only contains *two* alkaloids,—*hydrastine* and *berberine*.

I will not now enter into the consideration of all the active principles of hydrastis. For the present I shall confine myself to a study especially of *hydrastine*, regarded by most eminent authorities as the principal alkaloidal constituent of this plant.

As stated before, Mr. Perrins was the first investigator to isolate the pure *hydrastine*. More recently it has also been determined, especially by Mr. J. U. Lloyd,‖‖ Professor Power,¶¶ and others. It is generally obtained by exhausting the powder of the rhizome with water by means of percolation, separating the *berberine* as hydrochlorate by the addition of hydrochloric acid to the infusion. The mother liquid is then treated with ammonia in slight excess, and the hydrastine, in an impure state, is precipitated as a brownish powder; but is purified by repeated solutions in boiling alcohol. By this repeated crystallization, with the aid of animal charcoal, the alkaloid is obtained in colorless, or white, shining, four-sided prisms, which become dull when dry.

From the circumstance that hydrastine almost always forms imperfect crystals, it is certainly very difficult to obtain good specimens. With an excellent sample of the pure alkaloid I made several solutions in chloroform, alcohol, and ether, and, after failing several times, I, at last, succeeded in obtaining the crystals from the solution of ether by slow evaporation. An illustration of these crystals is given in Fig. 1.

FIG. 1.

Crystals of the sulphate of hydrastine, seventy diameters.

The white alkaloid of hydrastis, obtained by the method already described, has, according to the analysis of Mahla,*** and later of Professor Power,††† a chemical composition represented by the formula $C_{21}NH_{23}O_6$. Hydrastine is almost insoluble in water, but ether, alcohol, chloroform, and benzine dissolve it easily. It is colored yellowish brown by strong nitric acid, and with sulphuric acid and bichromate of potassium or peroxide of lead it gives a brick-red, assuming after a while a carmine-red color. Mixed with chlorine-water its solution acquires a blue fluorescence. It gives no coloration with concentrated hydrochloric acid, and, according to Professor Power, "concentrated sulphuric acid and monomolybdate of ammonium gives an olive-green color, which appears to be its most characteristic test." The crystals fuse at 135° C. (275° F.), and although generally of an alkaline reaction, they may be said to be tasteless.

Hydrastine can be differentiated from its sister alkaloid *berberine* by the fact that the latter is insoluble in ether, alcohol, chloroform, and benzine. Hydrastine unites with the acids to form salts, which are perfectly soluble in water, with the exception perhaps of the picrate and the tannate.

PHYSIOLOGICAL ACTION OF HYDRASTINE.

General Action.—Comparatively speaking, up to the present time, few investigators have studied the action of this drug upon the lower animals. Among these observers may be men-

* *Lond. Pharmaceut. Journ.*, May, 1862, p. 546.

† "Medical Flora of the United States," 1828, vol. i. p. 253.

‡ *Chemical Gazette*, 1847, p. 209.

§ *Ibid.*, 1847, p. 129.

‖ *Amer. Journ. of Sciences and Arts*, January, 1862.

¶ *Journ. of Chem. Society*, 1863.

** *Amer. Journ. of Pharm.*, 1878, p. 470.

†† *Ibid.*, 1873, p. 248. ‡‡ *Ibid.*, 1875, p. 481.

§§ *Proc. of Amer. Pharm. Assoc.*, 1886, p. 429.

‖‖ *Amer. Pharm. Assoc.*, 1878.

¶¶ *Ibid.*, 1884.

*** *Silliman's Amer. Journ.*, vol. xxxvi., No. 106, 1863, p. 57.

††† *Loc. cit.*

tioned the names of Professor Roberts Bartholow,* Mays,† Fellner,‡ and Slavatinski.§

Bartholow, who appears to have more widely than any of the others extended his general experiments, states that in the frog hydrastine produces muscular rigidity and paralysis of motion, followed by heightened cutaneous reflexes, tonic convulsions from above downward, succeeded by general convulsions with fibrillary trembling between them, and finally tetanus a few minutes before death; that it causes death by asphyxia, as the heart continued to beat after complete cessation of the respiratory movements, and that the cardiac muscular tissue loses its electro-excitability. That in warm-blooded animals (and gives the single example of a rabbit) it produces similar effects, and concludes that hydrastine belongs to the group of the excito-motor agents, heightening perception, cutaneous excitability, and the reflex functions, and causing death by tetanic fixation of the respiratory muscles.

It is regretted, however, that Bartholow's experiments are not detailed, for some of the results obtained in my researches do not entirely agree with his statements, and, besides, I have noticed effects produced by hydrastine not spoken of by him or any of the other writers that I have thus far consulted.

According to Falk,‖ the action of hydrastine is as follows: "In cold-blooded animals, a tetanic stage, with an increase of the reflex activity; a stage of complete paralysis, which commences with paralysis of the motor action of the spinal cord; paralysis of the heart, which first affects the inhibitory ganglia, and then the automatic ganglia; it has a local effect upon musculature. In warm-blooded animals, the paralytic stage begins earlier, and usually precedes the tetanic stage; increased contraction of the vessels, and blood-pressure follows stimulation of the medulla; this is, however, comparatively small, not persistent, but is interrupted by great falls of blood-pressure and vascular relaxation, especially during the tetanic attacks; during the tetanus the lengthening of the pulse takes place through central stimulation of the vagus; the same occurs in the advanced stage of the poisoning; paralysis of the vaso-motor centres follows upon their stimulation; after this, and up to the period of death, there is relaxation of the blood-vessels and fall of blood-pressure. Death, in poisoning by hydrastine, takes place by paralysis of the heart."

In order, therefore, to study more fully the general action of hydrastine, some of the most striking of my experiments are here given in detail. I may state that, for purposes of experimentation, the alkaloid itself, and chiefly its sulphate, have been employed, especially the latter, on account of its solubility.

Experiment 1.—Frog. Injected at 12.45 P.M. .002 gramme; 12.55, animal lies on his back motionless, and respirations are labored; has had convulsions, and shows a marked increase of reflex activity; 1.00, frog is placed on its belly, but is unable to move; is entirely paralyzed; 1.10, tetanic convulsions come on again; 1.20, breathing very much diminished, and heightened reflexes still noticeable; 4.00, paralysis is beginning to disappear, and movements are about normal, as is also the respiratory function; 4.15, frog can leap as when entirely well, and it appears that it will recover. Died next day, about five o'clock in the evening, in convulsions. After death, both muscles and nerves would not respond to faradization.

Experiment 2.—Frog. Gave hypodermically .005 gramme at 1.10 P.M.; 1.15, voluntary movements are slow, but reflex action is increased, as the slightest touch elicits convulsive movements; 1.17, paralysis is complete; 1.20, convulsive movements of tetanic character from above downward; 3.00, respirations have stopped entirely, but heart continues to beat; 3.30, animal is dead, and the heart, which has ceased in diastole, has its cavities distended with black blood. Muscles and nerves respond feebly, but only to powerful faradic current.

Experiment 3.—Frog. At 2.50 P.M. injected subcutaneously .002 gramme; 2.55, animal goes into well-marked tetanic convulsions; 3.00, breathing has stopped, but the heart continues its action; there is a very decided increase in the reflex activity, and the slightest touch of the skin produces powerful general spasm; paralysis has set in; 4.40, heart continues to beat, and convulsions can still be provoked by mechanical irritation. The animal died eventually.

Experiment 4.—Frog. Injected hypodermically at 3.25 P.M., .005 gramme; 3.30, animal quiet; 3.32, convulsive movements

* Lloyd's "Drugs and Medicines," vol. i., 1884–85.

† THERAPEUTIC GAZETTE, 1880.

‡ *Wein. Med. Jahrbücher*, 1885.

§ *Lancet*, May, 1886.

‖ *London Med. Recorder*, April 20, 1890, p. 136; *Virchow's Archiv*, Bd. 119, s. 389.

appear; 3.35, the batrachian is placed on its back; tetanic convulsions manifest themselves, and there are decided evidences of heightened reflexes; 3.46, paralysis is complete; 3.53, respiration has ceased, but the heart continues to act; 4.45, frog is dead. Stimulation by electricity elicited no response in either muscles or nerves.

Six other experiments gave similar results, and from these it may be inferred that hydrastine is a powerful poison to cold-blooded animals, producing in them the following general effects: Muscular rigidity, an increase in reflex activity, tetanic convulsions, paralysis, and finally death by failure of the respiration.

A series of experiments was made to determine the minimum fatal dose of hydrastine in the frog, as is shown in the following examples:

Experiment 11.—Frog; weight, 30 grammes. An injection of .003 gramme is given at 1.45 P.M.; 2.00, animal is convulsed, and shows a condition of increased reflex activity; 2.12, is completely paralyzed; 3.12, continues very feeble and respiration is labored; 6.00, animal still very sick, and finally dies.

To two other frogs of the same weight the same dose was administered with similar untoward effects.

Experiment 14.—Frog; weight, 30 grammes. .001 gramme was given hypodermically at 12 M. The usual symptoms, though feeble in character, were developed, and finally death, in about twenty-four hours, followed.

Experiment 15.—Frog; weight, 35 grammes. Received the same dose as last one, and although the animal labored under the influence of the drug for over thirty hours, it finally made a complete recovery.

Experiment 16.—Frog; weight, 32 grammes. The batrachian received hypodermically .001 gramme at 1.40 P.M.; 1.55, animal is perfectly paralyzed, but shows heightened reflexes; 2.15, breathing is labored; 4.55, paralysis begins to disappear; 5.10, animal can move and leap about as in a normal condition. All next day he appeared entirely well. On third day, frog continued apparently in good health, but at 11 A.M. tetanic convulsions returned, with the same increase of reflex activity, and died at 12.30.

From the foregoing observations it is ascertained that the minimum lethal dose of hydrastine in the common frog (*Rana esculenta*) is about .001 gramme for every thirty grammes of the animal's weight.

The effects produced by hydrastine in warm blooded animals resemble those exhibited in cold-blooded animals, but in these other phenomena manifest themselves, as will be seen in the following experiments:

Experiment 17.—Dog; weight, 4 kilos. At 1.55 P.M. gave by jugular vein .020 gramme of the sulphate; 4.10, a slight salivation appears. No other symptoms were noticed, and the animal recovered entirely.

Experiment 18.—Dog; weight, 6 kilos. Injected hypodermically 2 grammes at 12.05 P.M. No effects were produced.

Experiment 19.—Dog; same weight as last. Exposed jugular vein, and injected into it 1 gramme of drug at 11.45 A.M.; 11.46, breathing is arrested, and at 11.47 a violent tetanic convulsion sets in, which ends in death.

Experiment 20.—Mouse. Gave hypodermically .010 milligramme at 10.45; 10.46, respirations are hurried; 10.48, falls to one side, perfectly helpless; 10.50, violent convulsions appear; respirations are exceedingly labored; 10.52, the animal dies.

Experiment 21.—Dog; weight, 3 kilos. Administered subcutaneously .50 gramme at 11 A.M. No effects were produced, with the exception of slight salivation.

Experiment 22.—Pup; weight, 1½ kilos. At 1.45 P.M. received hypodermically .25 gramme; 2.30, no symptoms were observed, and at 2.35 gave .25 gramme more under the skin; 3.10, very pronounced salivation is noticed; 3.20, vomited mucus, and continued to salivate profusely; 4.00, vomited again; 4.10, retches, and once more vomited white, frothy mucus, and some biliary matter; is now quiet. Continues in this condition until six o'clock. Next morning by ten o'clock the animal had completely recovered.

A few days afterwards the same animal succumbed to a dose of .50 gramme after presenting the same symptoms, but in an aggravated form.

Experiment 23.—Pup; weight, 2 kilos. The animal received subcutaneously 1 gramme of drug about 3.30 P.M.; 4.00, is quiet, and licks his lips frequently; 4.15, salivation appears; 4.20, vomited white, frothy mucus; salivation is very profuse; 4.35, very uneasy, with frequent movements of the head to both sides; staggers; 4.40, falls to his side several times, and with difficulty regains his upright position; 4.44, has fallen on his right side, and is now unable to get up; his respirations are very laborious; 4.45, has a tetanic convulsion, which is followed by others of a clonic character; 4.47, convulsions cease a little, and the animal gives a series of shrieking

cries; 4.48, another tetanic convulsion, his head being powerfully thrust backward; 4.50, convulsions again cease, and dog utters cries anew; 5.05, respiration has stopped, but the heart continues to act; 5.07, animal dies in a tetanic convulsion, and immediately becomes stiff. Post-mortem examination showed that the heart had stopped in a diastolic condition, and was non-irritable. No other marked lesion was noticeable in the other organs, with the exception of a slight congestion of the lungs, some peristalsis, and a greenish coloration of duodenum, due, undoubtedly, to biliary extravasation.

Experiment 24.—Pup; weight, 1 kilo. Injected hypodermically .25 gramme of hydrastine at 12.25 P.M.; 12.30, begins to salivate; 12.40, vomits white, frothy mucus, and defecates; 12.50, retches and vomits again; 12.55, the emesis continues; 1.25, animal is very weak, and lies on his side unable to get up; 1.45, has clonic spasms; 1.55, tetanic convulsions appear, and on ceasing, the little pup utters several shrieking cries; 2.20, vomits biliary matter; 3.35, animal is much better, and only vomited now a watery discharge, mixed with bile; is very quiet, but able to stand up; 3.50, has gone to sleep; 3 55, is awakened, and vomits again; 4.00, is sound asleep; 8.30, the little pup has apparently recovered, and runs about. Next morning by ten o'clock the animal has marked stiffness of the jaws, and is exceedingly weak; lies down, with limbs perfectly relaxed. Continued in this condition until about 11 P.M., when he ceased to breathe, the heart continuing to beat for at least fifteen minutes later, when life was extinguished. Post-mortem examination showed no other prominent signs than the ones already mentioned; a slight congestion of lungs, diastolic arrest of the heart, some peristalsis, and a marked biliary extravasation.

Experiment 25.—Rabbit; weight, 2 kilos. Rodent received hypodermically 1 gramme at 10.40. No marked symptoms were produced for about an hour, with the exception of a slight salivation and an apparent increase in the number of respirations; 11.45, muscular tremblings are manifested, with loss of voluntary movements; sensibility somewhat heightened; 12.05 P.M., complete paralysis, followed by convulsions of a tetanic character; loss of sensation, as pinching elicits no pain; 12.45, respirations are gasping in character, and there is intense cyanosis of tongue and ears; heart continues to act forcibly; 1.00, breathing has stopped, but the cardiac viscus is still active; 1.12, animal dead.

Experiment 26.—Pigeon; weight, 2 hectogrammes. Bird received subcutaneously .50 gramme of hydrastine at 11.15 A.M.; 11.35, very uneasy; 12.40, falls to one side, with difficult respiration; 12.45, tetanic convulsions, gasping respirations, and death a few seconds afterwards.

Experiment 27.—Dog; weight, 5 kilos. Injected hypodermically .02 gramme of drug at 1.25 P.M. Rectal temperature before injection was 38° C. 1.45, vomits and salivates profusely; appears uneasy; 1.50, vomits again some biliary matter; 2.25, dog extremely weak; rectal temperature, 37.15° C.; 2.40, has general muscular tremblings; 2.50, tetanic convulsions set in; 3.25, rectal temperature, 37.20° C., and appears much better; 3.40, vomits again, watery discharge mixed with bile; 8.25, animal appears to have recovered, and his temperature has returned to normal,—38° C.

From the evidence brought forward by other observers and from my own general experiments, it is found that hydrastine is, in sufficiently large doses, a poison to both cold- and warm-blooded animals. In the first class of animals it produces a primary increase of the respiratory movements, followed by a decrease and final cessation of the same; muscular tremblings and rigidity; loss of voluntary movement; clonic and tetanic convulsions; increased, at first, and afterwards decreased reflex activity, and, lastly, death by failure of the respiration. It also exhausts the irritability of the muscles and the motor nerves, and very likely exercises an action upon both the sensory nerves and the sensory tract of the spinal cord. The drug likewise destroys the electro-excitability of the cardiac muscle, as that organ, which is always arrested in diastole, does not, after its stoppage, respond to faradization.

In warm-blooded animals, hydrastine produces similar effects: a primary stimulation, a decrease secondarily, and final cessation of the respiratory functions; heightened sensibility followed by a fall below normal; salivation; an increased flow of bile; vomiting; hyperperistalsis; loss of voluntary movement; paralysis; clonic and tetanic convulsions, and finally death by respiratory failure. It also exhausts the excitability of the cardiac muscular fibre, and diminishes bodily temperature.

Post-mortem examinations of the animals killed by hydrastine show, to the naked eye, no marked lesions of the internal organs, with the exception, perhaps, of a slight con-

gestion of the lungs, and a decided biliary extravasation. In order to study the changes which the drug might produce in the intimate constitution of the tissues themselves, these were examined microscopically in two cases, one of comparatively quick and the other of slow poisoning. In the first instance, the animal experimented upon died in four hours; in the second, the dog succumbed within three days.

The histological changes produced in the organs examined are not perhaps very remarkable, but I do not think it will be uninteresting to give a short description of them:

FIRST PUP.—*Brain.*—The organ does not show any changes, except a considerable number of cells, which are likely to be due to the young age of the animal.

Heart.—Normal in every respect.

Liver.—All the blood-vessels are dilated, especially the portal veins, and there is also dilatation of the bile-ducts, which show, besides, catarrhal changes. The liver-cells are slightly cloudy, swollen, and exhibit a more granular protoplasm than normally, the nuclei being less distinct.

Lung.—There is decided congestion of both pulmonary arteries and veins, and have in many places small thrombi. The blood-vessels are enormously dilated. The air-vesicles are overdistended, stretched out, presenting the character of an emphysematous lung. The alveolar septa between the elements are all thickened, and the connective tissue, doubtless through an irritative action, shows a cellular infiltration. The cell proliferation is quite prominent around the blood-vessels and the smaller bronchi. The epithelial lining of the air-vesicles and the bronchi is distinctly swollen and irritated.

SECOND PUP.—*Brain.*—Normal.

Heart.—In general the muscular tissue appears anæmic, most of the capillaries being empty. The muscular fibres show slight fatty metamorphosis. The cavities are filled with coagulated blood, and within these blood-masses large crystalline bodies of a dark-brown color are found, the crystals being somewhat needle-shaped and arranged in large bundles. Possibly they are hæmatoidin crystals.

Liver.—The hepatic cells are slightly atrophied, and the most of them infiltrated with fat, which appears in minute and large droplets. Some of the cells are completely converted into fat-vesicles, and are highly transparent, yet they have a sharp, definite contour, and retain admirably their pentagonal shape. The connective tissue does not seem to be increased, and both blood-vessels and biliary ducts are apparently normal. Some of the veins, especially the portal, contain blood; while the hepatic arteries and veins are empty. On the whole, the liver tissue may be considered as anæmic.

Lung.—The air-vesicles are distended, and some of them seem to have lost their alveolar septa, and to have stretched out into a common cavity, such as is found in emphysematous conditions. This is particularly marked near the edges of the lung. The bronchi are also dilated, and contain in their luminæan inflammatory (catarrhal) exudate, composed of desquamated epithelium, leucocytes, red blood-corpuscles, and mucus. The walls of the air-vesicles are, in most instances, intact, though evidently thickened. This thickening may be ascribed chiefly to an increase of the luminæ of the pulmonary capillary blood-vessels, due to overdistended blood-corpuscles, partly to the thickening of the septa referred to, and also to an infiltration of leucocytes. The air-vesicles are empty, although in a few instances some disintegrated material may be seen within the luminæ, having its source in an inflammatory exudate.

Kidney.—The epithelium is cloudy and swollen, so that the luminæ of the tubules are accidentally obstructed. This condition can best be seen in transverse sections; the blood-vessels may be considered anæmic; their walls, the connective tissue, and the Malpighian tufts appear to be normal.

From my own experiments, it is also determined that the minimum fatal dose of the drug in the dog, by hypodermic injection, is .50 gramme for every kilogramme of the body-weight.

Another interesting property is attributed to hydrastine, but which I have had no opportunity, so far, to corroborate. Fellner and A. T. Slavatinski* affirm that the alkaloid has a distinct and powerful ecbolic action. The latter experimenter found that in doses of from .01 to .03 gramme per kilogramme of the body-weight, hydrastine produces contraction in the fibres of the non-pregnant uterus.

A better knowledge of the physiological action of hydrastine can be obtained from studying the behavior of the drug on the different systems separately. I shall then proceed to make such a study.

* London *Lancet*, May 22, 1886.

ACTION ON THE MUSCULAR SYSTEM.

Hydrastine, in small doses, appears to have a stimulating effect on the muscular tissue. Toxic quantities, however, as may have been observed, destroy the excitability of the muscles in general, and especially of the cardiac muscular fibre, as both structures fail under such circumstances to respond to faradization. The following experiments illustrate this:

Experiment 28.—Frog. Destroyed brain and exposed calf-muscles. The shock having passed off, an injection of hydrastine was made into abdominal cavity at 11.25 A.M.; 11.45, muscular rigidity appears, followed soon after by tetanic convulsions. A faradic current is applied to exposed muscles, and these respond but feebly; 12.15, complete paralysis; respiration exceedingly labored; the same current is again applied to the muscles, but no contractions are produced.

Experiment 29.—Frog. Had his brain destroyed, and tied artery of the left posterior limb; exposed muscles of both calves. When the animal had recovered from the shock, he received hypodermically a lethal dose of the drug at 3.10 P.M.; 3.25, muscular tremblings and spasm are present; respiration difficult; 3.30, tetanic convulsions are observed; faradization of muscles of poisoned limb produces feeble contractions; muscles of left limb respond readily to the same current; 4.15, breathing has ceased, but heart continues to act. Electrical stimulation of the muscles of left limb elicited the usual contractions; no such effect could be observed in the muscles of poisoned leg.

Experiment 30.—Placed a cut-out heart of a frog in a solution of hydrastine. After the viscus has ceased to act, faradization was applied, but no response was elicited.

These experiments were repeated, with similar results. Experiments made with Marey's myograph show clearly the depressant action of hydrastine on the irritability of muscle. Usually the gastrocnemius of a frog was carefully prepared, connected with the instrument and with a common Dubois-Reymond's electrical apparatus and the corresponding key, in order to apply both the opening and closing shocks.

There appears to be at first, especially under minute doses, a period of excitement or stimulation, for in such a period the height of the curve is greater than normal, and the contraction somewhat prolonged. Gradually, however, the muscular irritability is diminished, and continues thus until it is entirely abolished. Under large doses there is no period of excitement.

This lessened excitability of the muscular fibre is not due, as might be supposed, to an exhaustion produced by the frequent application of electrical stimulation, but to the action of the drug, as shown by the results obtained in the normal and poisoned muscle, in the same period of time and subject both to the same currents. This has already been proven in previous experiments.

I will detail in the following tables some of the experiments performed:

TABLE AH.—*Experiment* 57.—Animal, frog; weight, 25 grammes.

Time. h. m.	Height of contraction in mm.	Remarks.
.....	...	Gastrocnemius of frog prepared. Stimulation at 15 c.c. between coils.
10.10	28	
10.12	...	Hypodermic injection of .001 gramme.
10.27	32	
10.32	20	
10.37	16	
10.40	...	Tetanic convulsions.
10.42	16	
10.47	16	
10.52	16	
10.57	10	
11.03	6	

TABLE CH.—*Experiment* 59.—Animal, frog; weight, 24 grammes.

Time. h. m.	Height of contraction in mm.	Remarks.
.....	...	Gastrocnemius prepared. Stimulation at 13 c.c. between coils.
12.08	30	
12.14	30	
12.30	28	Injection of .005 gramme.
12.35	16	
12.39	16	
12.48	16	
1.05	12	
1.32	6	
1.34	4	

ACTION ON THE NERVOUS SYSTEM.

Hydrastine, resembling strychnine in its action, produces an increased condition of the reflexes; clonic, but more frequently tetanic, convulsions and paralysis.

Reflex Action.—That the alkaloid produces a primary hyperexcitability of the reflexes is proven by the following experiment:

Experiment 31.—Frog. Brain destroyed, and waited for the shock to pass away. A beaker of water slightly acidulated with sul-

phuric acid was prepared; in it the right flaccid leg of the batrachian was immersed. Reflex action took place in eight seconds at 11.35 A.M. At 11.37 an injection was made into the abdominal cavity; 11.48, reflex action in two seconds; 11.50, reflex action in two seconds; 11.55, reflex action in three seconds; convulsions appear; 12.15, reflex action in five seconds; animal is paralyzed; 12.30, reflex action in eight seconds; 1.15, reflex action in twelve seconds; 1.30, reflex action in twenty seconds. The decrease of the reflexes continues gradually up to death.

This primary stage of increased reflex activity takes place when the iliac artery or the abdominal aorta has been tied before the administration of the drug. The examples that follow sufficiently explain themselves:

Experiment 32.—Frog. After the cerebrum was destroyed, the right sciatic nerve was dissected and isolated; then a tight ligature was applied around all the tissues, except the nerve, and waited for the shock to pass off. At 2.15 P.M. reflex action was observed in twelve seconds; 2.20, a subcutaneous injection of hydrastine was made into the anterior part of the frog's body; 2.40, protected limb was immersed in the acidulated solution, and reflex action was manifested in three seconds; 2.45, immersion of poisoned limb, reflex action in three seconds; 2.48, immersion of ligatured limb, reflex action in three seconds; 2.50, paralysis has ensued, as the animal will lie in any position in which it is placed; 2.58, immersion of unprotected leg, reflex action in six seconds; 2.59, immersion of non-poisoned limb, reflex action in four seconds; 3.02, powerful tetanic convulsions; 3.20, immersion of either foot, reflex action in fifteen seconds; 3.45, reflex action in twenty seconds. This depression is now steady, until it appears to be abolished just before death.

Experiment 33.—Frog. Tied abdominal aorta after ablating cerebrum, and, the shock having passed, reflex action in lower extremities was observed in ten seconds. At 3.15 an injection of the alkaloid was made in anterior part of the body; 3.25, reflex action in two seconds; 3.40, reflex action in two seconds; 3.45, reflex action almost immediately, and powerful convulsions are induced; 3.50, reflex action in three seconds; 3 55, reflex action in three seconds; 4 00, reflex action in four seconds; 4.15, reflex action in six seconds, and convulsions again; 4.45, reflex action in twenty-two seconds; 4.55, reflex action in thirty seconds.

The fact, then, that increased reflex activity is produced by hydrastine, after tying the peripheral arteries, shows that such an increase is of central origin, and is not due to any peripheral influence.

From a close observation of the preceding experiments another important fact is gleaned: that motion is lost before sensation, a fact that is directly opposite to the assertion of Mays's,* that sensation is lost before motion.

To explain the depression and the final abolition that follow the primary stage of increased reflex activity, I am led to take two important factors into consideration,—the sensory nerves and Setschenow's inhibitory centre in the medulla oblongata.

In corroboration of Mays's experiments, I have found that hydrastine produces anæsthesia when locally applied to the nerves; that, however, the depression of reflex activity in the poisoned frog is not due to a depression of the sensory nerves is shown by the fact, which I have observed, that high section of the cord induces a return almost to normal of the reflexes. This appears to show that the drug exercises a stimulant action on the chief inhibitory centre that controls reflex action. The details of one experiment will illustrate this point.

Experiment 34.—Frog. After the shock, from the operation to destroy cerebrum, had passed, reflex action was induced in five seconds. At 11.10 A.M. the frog received a subcutaneous injection of hydrastine; 11.35, reflex action in two seconds; 11.56, reflex action in four seconds, convulsions set in; 12.10, reflex action in four seconds, convulsions continue; 12.45, reflex action in thirty seconds; 12.48, severed cord in lower cervical region; 1.15, reflex action in twenty seconds; 1.40, reflex action in twelve seconds, animal paralyzed; 2.15, reflex action in thirty-five seconds; 2.40, reflex action in one minute and ten seconds; 3.00, no reflex action in five minutes.

For the present, therefore, I must come to the conclusion that hydrastine later in the poisoning diminishes, and finally abolishes, reflex activity through a double action,—that is, by stimulating, at first, Setschenow's centre in the medulla oblongata, and afterwards by paralyzing the spinal cord.

Motor Nerves.—It has been stated that, after death in the frog, through the action of hydrastine, faradization of the sciatics failed to produce contractions of the tributary mus-

* *Loc. cit.*

cles; and even this has been observed to be the case when these muscles could be induced to respond to the same current directly applied to them, showing that the motor nerve-trunks are overpowered by the alkaloid. The following experiments and examples of many others clearly show this action of the drug:

Experiment 35.—Frog. Prepared in the usual way, and exposed both sciatics. A ligature was placed around the left leg, excluding the corresponding nerve. An injection was made into the abdominal cavity at 2.35 P.M. The usual symptoms of poisoning by the alkaloid followed soon afterwards; 2.45, faradization of nerve of protected limb produced contractions of gastrocnemius; the muscles also responded readily to the same current; on stimulation of poisoned sciatic, feeble contractions of tributary muscles are induced; 3.10, no contractions of corresponding muscles are produced by faradization of the right sciatic; to the same current, applied to the nerve of ligatured leg, the respective muscles respond still, although not so readily. After death both nerves failed to act on electrical stimulation.

Experiment 36.—Frog. Ablated cerebrum and exposed both sciatics. On left nerve was placed locally a strong solution of hydrastine; on right sciatic, a weak salt solution, to prevent action of surrounding atmosphere. After a certain length of time (a little over two hours), faradization of right sciatic showed, of course, that this nerve was intact, but the same stimulus applied to poisoned sciatic failed to produce contractions of tributary muscles.

Hydrastine, therefore, paralyzes or exhausts the irritability of the motor nerves.

Paralysis.—My experiments show that the alkaloid under consideration destroys or depresses functional activity of the spinal cord, of the motor nerve-trunks, and of the muscles. So that it would appear that the paralysis which it causes is due to a depression of the whole motor apparatus.

Convulsions.—One of the most characteristic effects of hydrastine on the lower animals, especially the frog, is the production of convulsions, which are more commonly of a tetanic nature. These are observed all over the body, even when the abdominal aorta is ligated previous to the administration of the drug, thus cutting off the action of the alkaloid upon the parts deprived of the blood-supply. This is shown in Experiment 33, and from such a result it is inferred that the convulsions are not peripheral. That they are not cerebral is proven by the fact that they still occur after section of the cord.

Experiment 38.—Dog; weight, 3 kilos. Cut cord in cervical region. At 2.15 P.M. administered hypodermically 2 grammes of the drug; 3.30, has general tetanic convulsions, which continue at short intervals; 5.45, animal dies in a powerful tetanic convulsion.

Experiment 39.—Frog. After the animal was pithed, the spinal cord was exposed and destroyed as carefully as possible. This done, the batrachian received into abdominal cavity a dose of the alkaloid at 3.20 P.M. Animal dies at 6.15, but no convulsive movements of any kind occurred.

The convulsions produced by hydrastine, therefore, are of spinal origin.

ACTION UPON THE CIRCULATION.

Fellner,* Slavatinski,† and Bartholow‡ have, to a certain extent, studied the action of hydrastine upon the circulation.

Slavatinski affirms that the drug, in medium doses, paralyzes the vaso-motor centres, and thus decreases blood-pressure; that it acts on the heart first as a stimulant, and afterwards as a depressant of the motor ganglia, and that no effect seems to be produced on the peripheral endings of the pneumogastrics.

By Fellner it is asserted that large doses produce a transient rise in the arterial pressure, followed by a depression of the same; that medium-sized doses produced the same phenomena, only in a less prominent degree; that small quantities are followed by a slight diminution of the blood-pressure, succeeded very soon by a permanent rise; that division of the splanchnics or compression of the abdominal aorta did not materially change the above-described effects; that division of the spinal cord was not followed by any rise of the arterial pressure; and that, finally, when large doses exercise their depressing action on pressure, strychnine and dyspnœa are capable of elevating this.

Bartholow states that hydrastine acts upon both the inhibitory and motor apparatus of the heart, and that the drug produces a reduction of the blood-pressure.

The results of my own experiments are at variance, in one way or another, with all these investigations, regarding the action of the alkaloid upon the circulation, as will be seen in the course of this paper.

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* *Centralblatt für die Medicinische Wissenschaften*, November, 1884, p. 417.

† *Loc. cit.*

‡ *Loc. cit.*

With regard to the effects produced on the arterial pressure, I agree with Professor Bartholow, notwithstanding the fact that this investigator experimented on chloralized animals, from which no very accurate results can be obtained.

On the Heart.—Hydrastine is undoubtedly a heart-poison. It has been sufficiently proven by previous experiments that the drug, locally applied, or when administered through the circulation, affects directly the cardiac muscle and totally destroys its electro-excitability; but hydrastine appears to exercise no primary influence on the pneumogastrics, as will be seen hereafter.

On the Pulse.—Hydrastine, in small doses, increases the frequency of the heart's action, as will be observed in the following experiment:

TABLE I.—*Experiment* 40.—Animal, dog; weight, 22 kilos.

Time. h. m. s.	Dose.	Pulse in 20 sec.	Remarks.
4.15.00	.....	...	
4.15.20	.....	40	
4.15.40	.....	40	
4.16.00	.010 gramme.	40	Injection into jugular vein begun.
4.16.20	.....	70	Injection into jugular vein ended.
4.16.40	.....	75	
4.17.00	.....	70	
4.17.20	.....	64	
4.17.40	.....	60	
4.18.00	.....	60	

The increase is noticed when the pressure is far below normal, and as the drug does not appear to influence the vagi, it may be inferred that such a frequency depends on a direct primary action upon the intracardiac motor ganglia.

However, the most constant action of hydrastine, in moderate and in large doses, is to diminish the number of the heart pulsations, and at the same time to increase the size of the pulse-waves. The following experiments explain themselves:

Experiment 41.—Frog. Animal was pithed and heart exposed, which was beating 56 times a minute. At 12.02 P.M. injected subcutaneously .002 gramme of the drug; 12.07, heart beats only 26 per minute; 12.09, beats 15 per minute, and the batrachian goes into powerful tetanic convulsions; 12.15, heart beats about 4 times in the minute; the convulsions continue; 12.30, breathing has stopped, spasms continue, and the heart beats about once or twice in the minute.

Experiment 42.—Frog. Exposed heart after cerebrum had been ablated. The cardiac viscus was then beating at the rate of 44 per minute. Injected hypodermically .001 gramme at 11.42 A.M.; 11.45, heart's action slow but strong; beats 20 times in the minute; 11.48, 12 per minute; convulsions set in and respiration stops; 11.50, 8 per minute; and by 12 M. only 5 beats could be counted in the minute.

The same results are noticed when the isolated heart of the frog is placed in a solution of hydrastine.

TABLE II.—*Experiment* 43.—Animal, dog; weight, 5 kilos.

Time. h. m. s. P.M.	Dose.	Pulse per min.	Remarks.
2.00.00	.....	212	Normal animal; right carotid connected with manometer.
2.00.15	.....	200	
2.00.30	.....	200	
2.00.40	.12 gramme.	200	Injection into femoral vein begun.
2.00.55	.....	188	Injection into femoral vein ended.
2.01.10	.....	160	
2.01.25	.....	.....	
2.01.40	.....	132	
2.01.55	.....	76	
2.02.05	.....	.....	Animal dead.

TABLE V.—*Experiment* 46.—Animal, dog; weight, 7 kilos.

Time. h. m. s.	Dose.	Pulse per min.	Remarks.
.....	.....	.....	Normal animal; left carotid connected with kymograph; injection into external jugular vein.
3.15.00	.....	.....	
3.15.20	.....	210	
3.15.40	.....	210	
3.16.00	.....	210	
3.16.20	.10 gramme.	216	Injection begun.
3.16.40	.....	159	Injection ended.
3.17.00	.....	180	
3.17.20	.....	171	
3.17.40	.....	168	
3.18.00	.....	180	
3.18.20	.....	180	
3.18.40	.....	180	
3.19.00	.....	171	
3.19.20	.....	165	
3.19.40	.....	162	
3.20.00	.....	166	
3.20.20	.....	159	
3.20.40	.....	156	
3.21.00	.....	153	
3.21.20	.....	153	
3.21.40	.....	150	
3.22.00	.....	156	

Time. h. m. s.	Dose.	Pulse per min.	Remarks.
3.22.20	.....	150	
3.22.40	.....	150	
3.23.00	.....	150	
3.23.20	.....	150	
3.24.00	.....	153	
3.24.20	.....	153	
3.24.40	.....	150	
3.25.00	.....	147	
3.25.20	.....	150	
3.25.40	.....	147	
3.26.00	.....	144	
3.26.20	.....	144	Killed eventually with chloroform.

The phenomenon of pulse-rate diminution may and does generally depend upon these causes: Stimulation of the cardio-inhibitory apparatus, depression of the intracardiac ganglia, changes of blood-pressure, and a direct action on the heart-muscle itself.

Now, this depression of the heart's action produced by hydrastine persists after previous section of the pneumogastrics, and even after complete division of the medulla spinalis, as is shown in the experiments detailed below:

TABLE VII.—*Experiment* 48.—Animal, dog; weight, 14½ kilos.

Time. h. m. s.	Dose.	Pulse per min.	Remarks.
11.00.00	.....	.....	Left carotid used; vagi prepared.
11.00.20	.....	264	
11.00.40	.20 gramme.	264	Injection into external jugular.
11.01.00	.....	225	Tetanic convulsions.
11.01.20	.....	171	Injection ended.
11.01.40	.....	171	
11.02.00	.....	180	
11.02.20	.....	180	
11.02.40	.....	195	
11.03.00	.....	195	
11.03.20	.....	192	
11.03.40	.....	156	
11.04.00	.....	168	
11.04.05	.....	.....	Cut both pneumogastrics.
11.04.20	.....	204	
11.04.40	.....	216	
11.05.00	.....	216	
11.05.20	.....	216	
11.05.40	.....	210	
11.06.00	.....	204	
11.06.20	.....	208	

TABLE VIII.—*Experiment* 49.—Animal, dog; weight, 4½ kilos.

Time. h. m. s.	Dose.	Pulse per min.	Remarks.
3.30.00	.....	.....	Right carotid used.
3.30.20	.....	180	Both vagi cut.
3.30.30	.....	192	
3.30.40	.....	264	
3.30.50	.....	270	
3.31.00	.....	258	
3.31.10	.....	258	
3.31.15	.20 gramme.	.....	Injection into external jugular begun.
3.31.20	.....	216	Injection into external jugular ended.
3.31.30	.....	216	
3.31.40	.....	156	
3.31.50	.....	156	
3.32.00	.....	156	
3.32.10	.....	138	
3.32.20	.....	144	
3.32.30	.....	138	
3.32.40	.....	150	
3.32.50	.....	144	
3.33.00	.....	144	
3.33.10	.....	144	
3.33.18	.....	.....	Animal dead.

TABLE X.—*Experiment* 52.—Animal, dog; weight, 15 kilos.

Time. h. m. s.	Dose.	Pulse per min.	Remarks.
.....	.....	.....	Cord cut at lower cervical region; vagi divided; artificial respiration.
4.20.00	.....	156	
4.20.15	.015 gramme.	156	Injected into external jugular.
4.20.35	.....	141	
4.20.55	.....	150	
4.21.15	.....	141	
4.21.35	.....	141	
4.21.55	.....	138	
4.22.15	.....	135	
4.22.35	.....	135	
4.22.55	.....	126	
4.23.15	.....	123	
4.23.35	.....	126	
4.23.55	.....	132	
4.24.15	.....	147	
4.24.35	.....	156	
4.24.55	.....	156	

The alkaloid under consideration does not seem to exercise any influence on the trunks of the vagi, as their section in the poisoned animal (see Experiment 48) produced (although not even to the original rate) an increase in the number of heart pulsations. Again, faradization of the pneumogastrics in the hydrastinized dog causes an instantaneous arrest of the heart.

To judge, therefore, from the results of the foregoing experiments, it appears that hydrastine diminishes the number and increases the volume of the cardiac beats by an action upon the heart-muscle and the intracardiac ganglia.

On the Blood-Pressure.—As stated before, one investigator, Fellner, affirms that hydrastine, under many circumstances, produces a

distinct rise of the arterial pressure, a statement which I have never been able to corroborate.

The alkaloid in minute, medium, and poisonous doses, and whether it is administered hypodermically into the peritoneal cavity or through the circulation directly, invariably causes the column of mercury in the manometer to fall below the normal height. Lethal doses are followed by a fall, which continues up to death, while in small and moderate quantities the decreased pressure gradually rises again, but never above the normal point. This is shown in the following experiments (see also Figs. 2 and 3):

TABLE XI.—*Experiment* 43.—Animal, dog; weight, 5 kilos.

Time. h. m. s.	Dose.	Blood-pressure. mm.	Remarks.
2.00.00	.....	106–122	Normal animal; right carotid connected with manometer.
2.00.15	.....	106–122	
2.00.30	.....	106–122	
2.00.40	.12 gramme.	106–122	Injection into femoral vein begun.
2.00.55	.....	70–80	Injection ended.
2.01.10	.....	70–80	
2.01.25	.....	106–114	
2.01.40	.....	20	
2.02.05	.....	.....	Animal dead.

TABLE XIV. — *Experiment* 46. — Animal dog; weight, 7 kilos.

Time. h. m. s.	Dose.	Blood-pressure. mm.	Remarks.
.....	.....	.....	Normal animal; left carotid connected with kymograph.
3.15.00	.....	118–124	
3.15.20	.....	118–124	
3.15 40	.....	116–128	
3.16.00	.....	110–128	
3.16.20	.10 gramme.	112–132	Injection into external jugular begun.
3.16.40	.....	80	Injection into external jugular ended.
3.17.00	.....	22–30	
3.17.20	.....	24	
3.17.40	.....	22	
3.18.00	.....	14–24	
3 18.20	.....	12–20	
3.18.40	.....	14–22	
3.19.00	.....	14–22	
3.19.20	.....	16–24	
3.19.40	.....	22	
3.20.00	.....	20–26	
3.20.20	.....	22–26	
3.20.40	.....	24–30	
3.21.00	.....	26–32	
3.21.20	.....	30–34	
3.21.40	.....	30–36	
3.22.00	.....	34–40	
3.22.20	.....	36–42	
3.22.40	.....	40–42	
3.23.00	.....	42–50	
3.23.20	.....	46–52	
3.23.40	.....	50–56	
3.24.00	.....	54–60	
3.24.20	.....	56–60	
3.24.40	.....	54–60	
3.25.00	.....	58–64	
3.25.20	.....	60–66	
3.25.40	.....	62–68	
3.26.00	.....	64–72	
3.26.20	.....	64–68	
3.26.40	.....	68–74	
3.27.00	.....	68–74	
3.27.20	.....	76–82	
3.27.40	.....	76–82	
3.28.00	.....	74–78	
3.28.20	.....	74–78	
3.28.40	.....	78–82	Killed eventually with chloroform.

TABLE XVI. — *Experiment* 47.—Animal, dog; weight, 22 kilos.

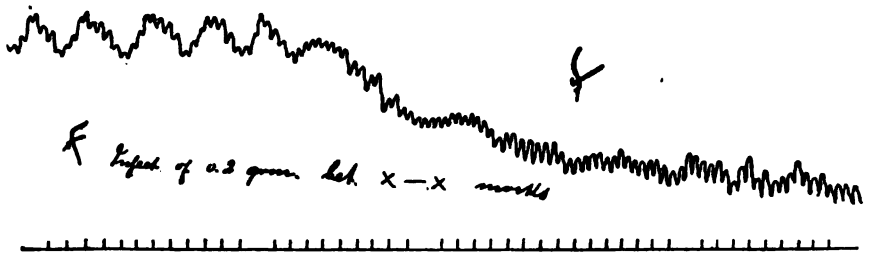
Time. h. m. s.	Dose.	Blood-pressure. mm.	Remarks.
4.15.00	.....	124–144	Normal animal.
4.15.30	.....	124–144	
4.16.00	.010 gramme.	124–144	Injection into jugular vein begun.
4.16.20	.....	90–106	Injection into jugular vein ended.
4.16.40	.....	60–80	
4.17.00	.....	60–80	
4.17.20	.....	64–90	
4.17.40	.....	66–94	
4.18.00	.....	60–102	Struggles.

A depression of the heart's action, due either to a direct cardiac or to an inhibitory influence, and a paralysis of the vaso-motor system, will cause a reduction of the blood-pressure. It is found that the pressure is lowered under hydrastine, after previous section of the pneumogastrics, as will be observed in the experiment detailed below, an example of many others performed.

TABLE XVII.—*Experiment* 49.—Animal, dog; weight, 4 kilos.

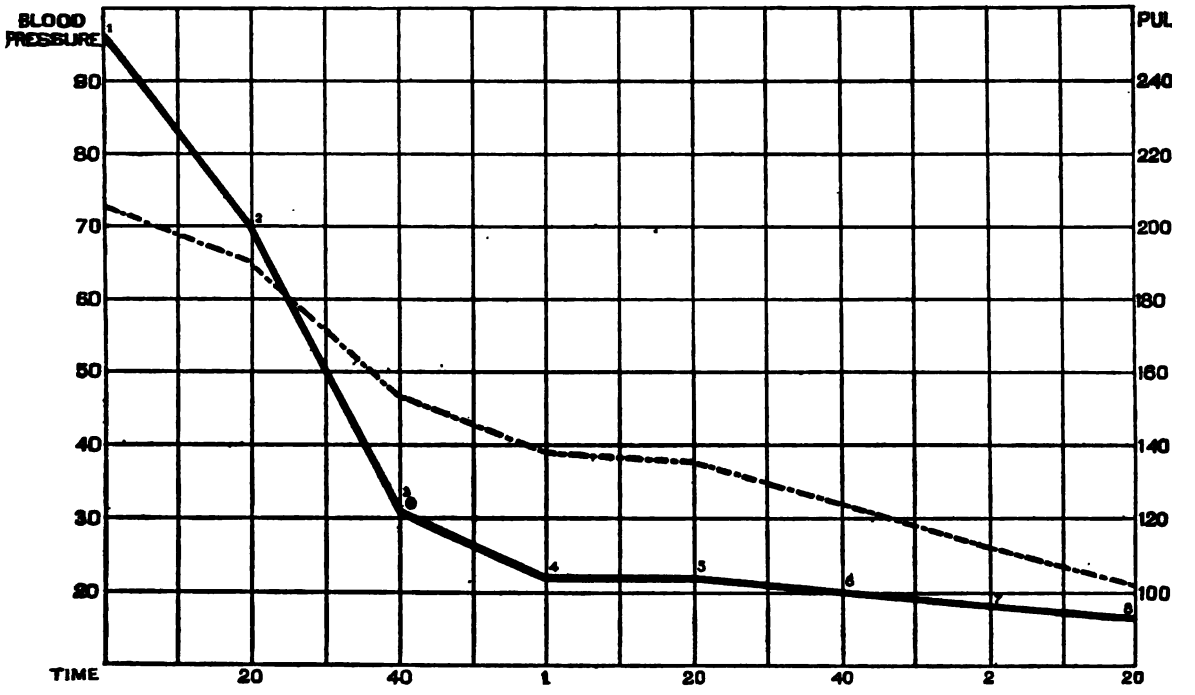
Time. h. m. s.	Dose.	Blood-pressure. mm.	Remarks.
3.30.00	.....	90–124	Left carotid connected with manometer.
3.30.20	.....	110	Cut both vagi.
3.30.30	.....	110–154	
3.30.40	.....	104–118	
3.30.50	.....	90–140	
3.31.00	.....	100–124	

FIG. 2.



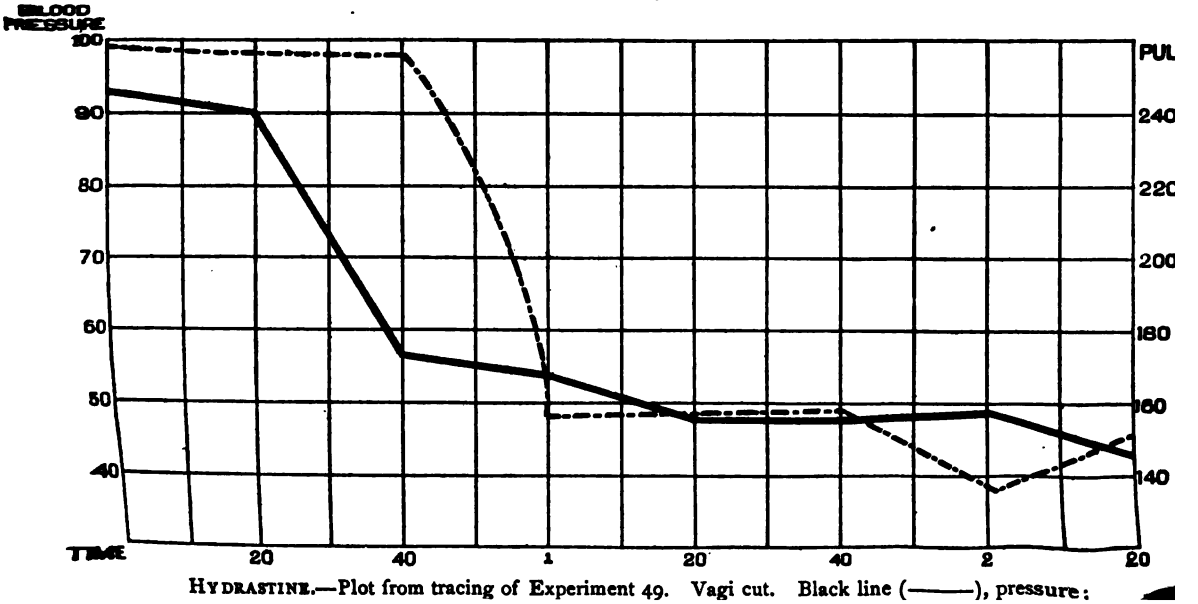
Tracing showing the action of hydrastine on the blood-pressure and the rate and volume of the pulse.

FIG. 3.



HYDRASTINE.—Plot from tracing of Experiment 47. Normal. Black line (———), pressure; broken line (– – – –), pulse.

FIG. 4.



HYDRASTINE.—Plot from tracing of Experiment 49. Vagi cut. Black line (———), pressure;

Time. h. m. s.	Dose.	Blood-pressure. mm.	Remarks.
3.31.10	.....	80–106	
3.31.15	.20 gramme.	.....	Injection into external jugular begun.
3.31.20	.....	84–96	Injection into external jugular ended.
3.31.30	.....	56	
3.31.40	.....	54	
3.31.50	.....	40–56	
3.32.00	.....	44–56	
3.32.10	.....	44–56	
3.32.20	.....	42–56	
3.32.30	.....	36–50	
3.32.40	.....	36–46	
3.33.18	.....	.....	Animal dead.

The cause, then, of the lowering of the blood-pressure, produced by the drug, resides in the heart itself or in the vaso-motor system. Of several experiments made by severing the cord to produce the corresponding vaso-motor paralysis, before the ingestion of the alkaloid, I only detail two,—one, in which the cord was only partially divided; and another, in which post-mortem examination showed complete section of the medulla spinalis. In both instances, as will be seen, the administration of hydrastine was followed by the usual phenomenon of blood-pressure reduction.

TABLE XVIII.—*Experiment* 51.—Animal, dog; weight, 3 kilos.

Time. h. m. s.	Dose.	Blood-pressure. mm.	Remarks.
.....	.....	.....	Vagi divided; cord partially cut.
3.45.00	.....	140–160	
3.46.00	.....	150–164	
3.46.30	.10 gramme.	150–164	Injection into external jugular begun.
3.46.50	.....	90–100	Injection into external jugular ended.
3.47.10	.....	50	
3.47.30	.....	46	
3.47.50	.....	46	
3.48.10	.....	46	
3.48.30	.....	46	
3.48.50	.....	48	
3.49.10	.....	48	
3.49.30	.....	54	
3.49.50	.....	56	
3.50.10	.....	58	
3.50.30	.....	60	
3.50.50	.....	64	
3.51.10	.....	64	
3.51.30	.....	64	
3.51.50	.....	66	
3.52 10	.....	66	
3.52.30	.....	66	
3.52.50	.....	66	

TABLE XIX.—*Experiment* 52.—Animal, dog; weight, 15 kilos.

Time. h. m. s.	Dose.	Blood-pressure. mm.	Remarks.
.....	.....	.....	Cord cut at lower cervical region;* vagi divided; artificial respiration.
4.20.00	.....	150	
4.20.15	.015 gramme.	150	Injection into external jugular begun.
4.20.35	.....	120	Injection into external jugular ended.
4.20.55	.....	40–60	
4.21.15	.....	30–46	
4.21.35	.....	22–34	
4.21.55	.....	20	
4.22.15	.....	20	
4.22.35	.....	20	
4.22.55	.....	22–30	
4.23.15	.....	22–30	
4.23.35	.....	28–36	
4.23.55	.....	30	
4.24.15	.....	36	
4.24.35	.....	36	
4.24.55	.....	36	
4.25.15	.....	34	
4.25.35	.....	34	

The most obvious conclusion to be drawn from the results of these latter experiments would appear to be that hydrastine diminishes the pressure of the blood by a direct action upon the heart. Such, however, is not the case, and there is sufficient evidence to prove that the drug likewise influences the vaso-motor system.

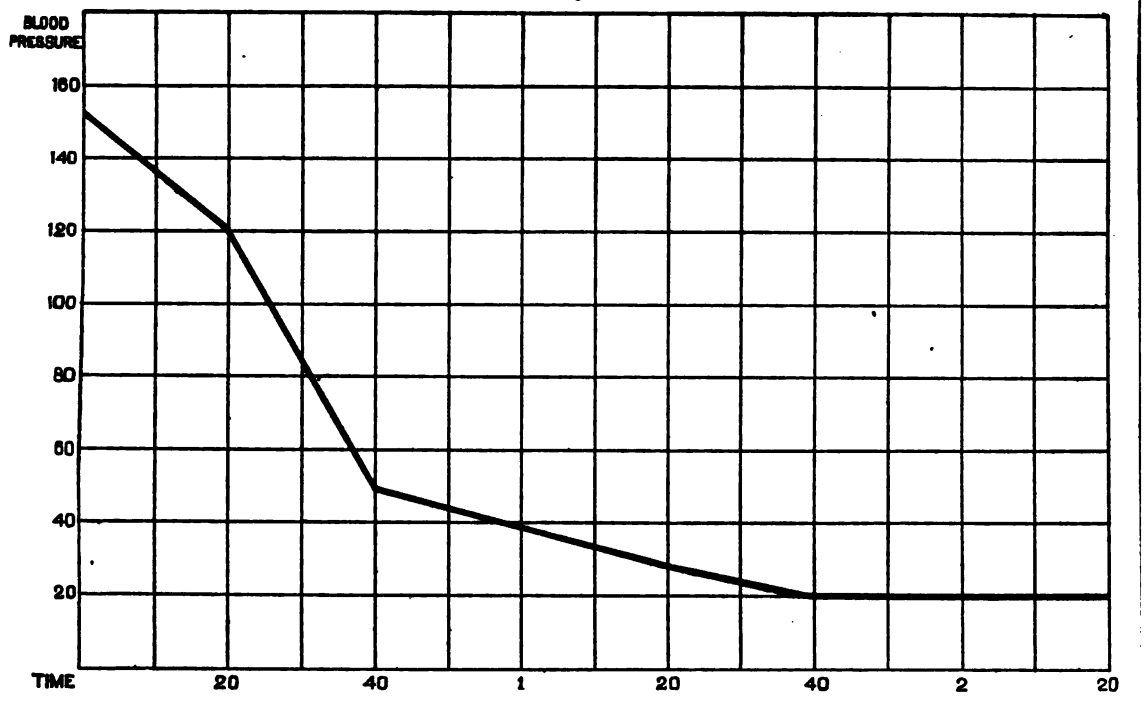
In the normal animal we have generally a lowered pressure taking place *pari passu*, with a diminution in the number of heart-beats, from which we could infer that the phenomenon under consideration was due to a cardiac action. But it is found that in such circumstances neither asphyxia nor faradization of a sensitive nerve (which in the non-poisoned animal would cause a rise in the blood-current) is able to produce appreciable changes in the lowered condition of the arterial pressure, and, if any are noticed, they are those which would be observed in an animal subjected alone to the action of the poison.

The following examples sufficiently explain themselves:

TABLE XX.—*Experiment* 53.—Animal, dog; weight, 9 kilos.

* Verified by post-mortem.

FIG. 5.



HYDRASTINE.—Plot from tracing of Experiment 52. Cord and vagi cut.

Time. h. m. s.	Dose.	Blood-pressure. mm.	Remarks.
3.25.00	.....	112	Normal animal.
3.25.10	.010 gramme.	112	Injection into jugular begun.
3.25.20	.....	100	Injection into jugular ended.
3.25.30	.....	110	
3.25.40	.....	130	Convulsions set in.
3.25.50	.....	114	Convulsions cease.
3.26.00	.....	96	
3.26.10	.....	98	
3.26.20	.....	100	
3.26.40	.....	98	
3.27.00	.....	98	
3.27.20	.....	110	Convulsions.
3.27.40	.....	100	Convulsions cease.
3.28.00	.....	98	Stopped drum five minutes.
3.33.00	.. ..	98	
3.33.20	.....	96	Started asphyxia.
3.33.40	.....	90	
3.34.00	.....	60–140	
3.34.20	.....	76–150	
3.34.40	.....	80–134	
3.35.00	.....	70–150	
3.35.20	.....	76–130	
3.35.40	.....	90–130	
3.36.00	.....	70–140	

TABLE XXI. — *Experiment* 54. — Animal, dog; weight, 4 kilos.

Time. h. m. s.	Dose.	Blood-pressure. mm.	Remarks.
.....	.....	.....	Normal animal; sciatic prepared.
5.10.00	.....	106	
5.10.20	.....	100–110	
5.10.40	.010 gramme.	100–118	Injection into jugular begun.
5.11.00	.....	50–56	Injection into jugular ended.
5.11.20	.....	40–50	
5.11.40	.....	40–50	Weak faradization of sciatic.
5.12.00	.....	50–60	
5.12.20	.....	48–56	
5.12.40	.....	80–88	Strong faradization of the same nerve.
5.13.00	.....	70–76	
5.13.20	.....	94	
5.13.40	.....	100–110	
5.14 00	.....	100–114	
5.14.20	.....	102–116	

These results, therefore, indicate that hydrastine produces lowering of the arterial pressure in two ways,—by a direct action on the heart, and also through a paralyzing influence exercised on the vaso-motor system.

When the drug is injected directly into the carotid artery, there is noticed an immediate fall of the blood-pressure, which may be said to be due wholly to a vaso-motor influence, as the effect is produced undoubtedly before the heart is reached. This is shown in the following experiment:

TABLE XXII.—*Experiment* 54*a*.—Animal dog; weight, 12 kilos

Time. h. m. s.	Dose.	Blood-pressure. mm.	Remarks.
.....	.....	.....	Normal animal; left carotid connected with kymograph.
2.15.00	.....	102–142	
2.15.30	.015 gramme.	100–140	Injection into right carotid artery begun.
2.15.40	.....	94–124	Injection ended.
2.15.50	.....	86–118	
2.16.00	.....	64–98	
2.16.10	.....	52–88	
2.16.20	.....	46–80	
2 16.30	.....	40–78	
2.16.40	.....	36–78	
2.16.50	.....	36–78	
2.17.00	.....	32–70	
2.17.20	.....	40–80	
2.17.40	.....	40–80	
2.18.00	.....	40–76	
2.18.20	.....	40–76	
2.18.40	.....	44–82	
2.19.00	.....	50–82	
2.19.20	.....	52–86	
2.19.40	.....	52–90	Killed with chloroform.

A very interesting question arises now. Is this vaso-motor influence centric or peripheral? For the present I am inclined to believe that it is centric, owing to the fact that the arterioles do not seem to suffer any change until late in the poisoning, and it is then that they appear to be widely dilated. I have observed this late relaxation in the web of the frog's foot, under the microscope with the aid of the micrometer; but whether ultimately the blood-vessel walls or the vaso-motor nerves themselves are affected, it has not been accurately determined. However, there is strong evidence, in the course of my study, to show that the centric vaso-motor system is chiefly influenced by the alkaloid.

On the Respiration.—It has been intimated that hydrastine is a powerful depressant of the respiratory function, and proven precisely that it kills by failure of the respiration.

The drug, however, in moderate doses, produces at first an increase in the number of the respiratory movements, followed by a decrease, and, if the amount of the drug has been sufficiently poisonous, by a final cessation of the function under consideration.

This increase is due probably to a stimulation of the peripheral vagi, as such a result was not observed after the pneumogastrics were divided.

A good example of this primary action of hydrastine in the normal animal is given in the following experiment, but the cause was not fully determined.

TABLE XXII.—*Experiment* 55.—Animal, dog; weight, 4½ kilos.

Time. h. m. s.	Dose.	Respirations per minute.	Remarks.
1.30.00	.....	45	Normal animal.
1.30.20	.....	42	
1.30.40	.....	42	
1.31.00	.05 gramme.	39	Injection into jugular begun.
1.31.30	.....	50	Injection into jugular ended.
1.32.00	.....	52	
1.32.30	.....	58	
1.33.00	.....	46	
1.33.30	.....	38	
1.34.00	.....	32	
1.34.30	.....	22	
1.35.00	.....	18	
1.36.00	.....	22	
1.37.00	.....	27	
1.38.00	.....	27	
1.39.00	.....	29	
1.40.00	.....	29	
1.41.00	.....	34	
1.42.00	.....	33	

On Temperature.—Hydrastine, in small doses, does not seem to affect the temperature in the normal animal; but large and poisonous quantities reduce it to an appreciable extent, as is shown in this experiment:

TABLE XXIII.—*Experiment* 56.—Animal, dog; weight, 5 kilos.

Time. h. m. s.	Dose.	Rectal temp. C. scale.	Remarks.
12.20.00	.....	38.20°	Normal animal.
12.25.00	1.5 gramme.	.....	Injected hypodermically.
12.40.00	.....	38.5°	
12.55.00	.....	37.15°	Vomits white frothy mucus.
1.10.00	.....	37.5°	
1.25.00	.....	37.15°	
1.55.00	.....	38.15°	Has a tetanic convulsion.
2.25.00	.....	38.20°	

On the Pupil.—The drug, when given hypodermically or intravenously, produces no apparent change in the pupil. Locally applied, however, the alkaloid causes at first (due undoubtedly to reflex irritation) contraction, followed after a time by a dilatation of the pupil.

On the Glandular System.—Hydrastine produces, even in moderate quantities, an appreciable increase of both the salivary and the biliary secretions. With regard especially to the latter effect of the drug, the results of my

experiments are confirmatory of those obtained by the elaborate researches of Rutherford.*

CONCLUSIONS.

I shall now give a *résumé* of the conclusions which I have been led to adopt from the foregoing study:

1. Hydrastine is poisonous to both cold- and warm-blooded animals.

2. The minim fatal dose of the drug in the common frog (*R. esculenta*) is .001 gramme for every thirty grammes of the animal's weight.

3. The minimum fatal dose of the alkaloid in the dog, by hypodermic injection, is .50 gramme for every kilogramme of the body-weight.

4. Hydrastine destroys the irritability of the muscular tissue.

5. The alkaloid likewise destroys the excitability of the efferent or motor nerves.

6. Very large quantities produce loss of the functional activity of the efferent or sensory nerve-fibres, and also cause anæsthesia when locally applied.

7. Hydrastine, in small amounts, increases reflex activity by stimulating the spinal cord.

8. Later in the poisoning, by large quantities, hydrastine diminishes reflex action by stimulating at first Setschenow's centre in the medulla oblongata, and afterwards abolishes it by paralyzing the spinal cord.

9. The paralysis produced by the drug is due to an action upon the muscles, the motor nerves, and spinal cord.

10. The convulsions of hydrastine are of a spinal origin.

11. Hydrastine destroys the electro-excitability of the cardiac muscle.

12. The alkaloid, in small doses, produces a primary frequency in the pulse-rate, due probably to a stimulating action on the cardiac motor ganglia.

13. In moderate and poisonous amounts it diminishes the number and increases the size of the cardiac beats by an action upon the intracardiac ganglia and the heart-muscle itself.

14. Hydrastine lowers arterial pressure by a direct action on the heart, and also through a paralyzing influence exercised upon the centric vaso-motor system.

15. The drug produces at first an increase, and afterwards a decrease, in the number of the respiratory movements.

16. Hydrastine kills by failure of the respiration.

17. The alkaloid lowers bodily temperature.

18. The drug increases peristalsis.

19. In hydrastine-poisoning the salivary and the biliary secretions are largely increased, especially the latter.

20. Hydrastine locally applied produces at first contraction of the pupil; afterwards dilatation of the same.

(To be continued.)

* *British Medical Journal*, vols. i. and ii., 1879.

THE TREATMENT OF TUBERCULAR LARYNGITIS.†

By C. P. Ambler, M.D.,‡ Asheville, N. C.

IT is only with the advent of the operative procedures of Heryng and Krause that the curative treatment of tubercular affections of the larynx can be said to have been established.

By this I do not mean to say that tubercular processes of that locality never were healed, or were not aided in their healing, by our previous means, for we know that, even without any intervention of the healing art, nature has effected cures. Such cases were, however, the rare exception, and the various local applications seldom amounted to more than palliation.

Recently our resources, outside of operative measures, were enriched by Professor Koch's discovery of a remedy which acts specifically upon tubercular tissues, and particularly the laryngeal affections, where its action could be observed under the eye, were at once pointed out as the most favorable for the employment of his method.

Six months have now elapsed since its first employment, and while a number of cures are on record as undoubted evidence of the value of his discovery, in a much larger number the remedy seems to have failed, in part or entirely, and our great hopes that it would supersede all other means, both operative and palliative, are no longer justified by the accumulated experience of the best men in their special field of labor: and while its true position as a curative agent is being established, we must, as before, bring to our aid such other means as our experience justifies, especially so in cases where the remedy of Koch

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either seems to fail, or where other means can prepare the way for its successful employment.

It is not the object of this paper to deal particularly with results obtained from Koch's method, not enough cases having come under my observation for such a purpose, and those which I have observed were, with few exceptions, cases far advanced in tubercular disease of the lungs, and the laryngeal affection had also reached an advanced stage.

It may, however, be interesting to mention the effect of the remedy in those, comprising six cases, of which four were well advanced, both in the pulmonary and laryngeal affections, and two cases were in an early stage.

J. R., aside from his pulmonary disease, presented, upon examination, infiltration and swelling of the right arytenoid cartilage and slight infiltration of the posterior commissure. He was admitted to the Winyah Sanitarium January 14, and placed upon the Koch method of treatment.

His larynx, except some temporary congestion after the small doses of lymph used in the beginning, showed no permanent or important change until February 8, after six milligrammes had been given him on the previous day. During the night he suffered severe pain, and deglutition became very much interfered with. Upon examination, a number of miliary tubercles were found upon the previously involved right arytenoid cartilage; a few were also seen upon the left, and the swelling and hyperæmia were more intense.

These miliary bodies gradually disappeared in the course of ten days, and with them the swelling, leaving an unbroken surface, and the infiltration became so reduced that, on the 24th of February, the larynx was pronounced entirely normal.

He has since received injections up to .025 gramme without any further change in the larynx; the local condition of the lungs has also made great progress for the better, cough and expectoration are almost absent, and a steady improvement in flesh and strength goes hand in hand with the continuance of the remedy. The tubercle bacilli have also gradually and steadily diminished.

Another case is that of Mrs. E., who received local treatment for her tubercular laryngitis at my hands for some months previous to the administration of Koch's lymph. There was also slight infiltration of both arytenoids, and lactic acid applications improved the hyperæmia and seemed to hold further advance of the disease in check. Injections with Koch's lymph began on January 1, 1891, and the patient reacted in her larynx after .003 gramme was reached. A number of local reactions followed, with the usual temporary hyperæmia and swelling.

After March 14 no further reactions in the larynx occurred, and the infiltration has since entirely disappeared.

These are the only two early-stage cases of laryngeal tuberculosis who have been subjected to the lymph treatment, and in these the results are entirely satisfactory; indeed, it may be said that they are apparently cured.

It is, however, much different in the more advanced cases. The dosage in these, on account of the also advanced pulmonary tuberculosis and the depressed general health of the patient, had to be very small, only .003 gramme being reached. Owing to considerations outside of the laryngeal disease, the Koch method was suspended in three cases, and the patients put upon other management. Typical local reactions had been noted in all.

In one case some reduction of an infiltration of the posterior commissure did occur. Otherwise it cannot be said that the treatment had any material influence upon the laryngeal or lung-disease, nor upon the general condition of the patient, and it was given up because Dr. Von Ruck, the director of the institution, believed that better results would follow our old methods, and our subsequent experience proved this to be so.

I come now to the consideration of other methods of treatment, which are either curative or palliative.

When the pulmonary disease is far advanced and apart from the laryngeal affections, permanent arrestment of the disease is improbable or impossible, no procedures which are very painful and are attendant with subsequent suffering should be adopted, unless something material is thereby to be gained, either in relieving symptoms, or for the prolongation of life.

It is, under such conditions, difficult to say where the curative treatment ends and the palliative begins, neither are the measures we employ so radically different but what one or the other may come into use as a palliative or for a curative purpose, especially if we leave out of the question extirpation of the larynx, or laryngotomy, for the radical removal of the affected parts.

The object of the curative method is to remove or destroy tubercular tissue, either direct or indirect, and to bring about cicatrization.

In early-stage cases where the infiltration is limited the prospects from Koch's method seem good; but, apart from its employment, we have other means which have produced satisfactory and lasting results. Foremost among these stand the operative procedures with the curette, punch, and double-cutting curette, as employed and described by Heryng and Krause.

It is not probable that in their application all tubercular tissue is removed. Any one who expects to do that could not be satisfied with less than total extirpation of the organ. With the curette we break down the deposits and remove the proliferations, and set up an increased nutritive process during the reaction following the procedure, leading to cicatrization. Remaining tubercular tissue is either thrown off during the process of repair, or, with and after cicatrization, it undergoes pressure atrophy and absorption, or both.

When the larynx is entirely or extensively involved, when the deposits, ulcerations, and proliferations are beyond our reach, even in part, but particularly when, by the concomitant advance of lung-disease and other complications, the increased nutritive changes after operative procedures cannot take place, cicatrization will, of course, not follow, and by operation we not only gain nothing, but leave our patient the worse for our interference.

In a properly-selected case, however, we remove at successive sittings portions of infiltrated areas with the double curette or punch. This, of course, is done under cocaine and with the aid of the mirror, hemorrhage being slight, and generally easily controlled by applications of a strong solution of lactic acid upon a cotton-wrapped probe. According to the locality operated upon, it becomes more or less painful, the pain and soreness lasting from twenty-four to thirty-six hours. These slight operations are followed by moderate swelling and inflammatory reaction, which disappear in the course of some forty-eight hours; the lesion heals readily, leaving a pearly-white cicatrix. The operations are repeated at intervals of five or six days, until all the accessible infiltrations and proliferations are removed. Ulcerations which show no disposition to heal are scraped and treated with lactic acid, ten to eighty per cent., the latter being applied and rubbed in with a cotton-wrapped probe.

The most difficult to manage are the often enormously-thickened infiltrated cords; indeed, it must be confessed that our present resources are inadequate to do anything curative with them, and it is to be hoped that, if not Koch's, it may be Liebreich's remedy which will come to our aid in such cases.

The infiltrations and proliferations frequently present, difficult to see, and more difficult to reach, involving structures below the cords, will ever be a trial to the operator or him who wishes to make direct applications; besides, to do anything in that locality requires a patient who can bear prolonged manipulations. Lactic acid upon the cotton-wrapped probe, after cocaine, can be thoroughly applied, but operative measures will always be restricted.

When by such means we have been able to, so to say, "clear out the larynx," and have obtained cicatrization, the case may be said to be cured, at least apparently, and I have rarely seen relapses until, from the advance of tuberculosis in the lungs and other complications, the general nutritive process became seriously impaired.

Palliation is more frequently the object of our local treatment, and the earlier-stage cases, where we can hope to cure, are not so often seen in our institution as are those who show extensive involvement and destructive processes. Similar changes, as a rule, accompany them in the lung, and the treatment of the larynx has for its object the relief of cough, of pain, especially upon deglutition, and occasionally the removal of stenosis. For the latter, in a patient not entirely exhausted, the cutting curette can generally accomplish all that is necessary, and is far preferable to tracheotomy. This should not be thought of, except under extreme circumstances and in cases which absolutely cannot tolerate intralaryngeal operations.

When the ulcerations are not too extensive, lactic acid, and sometimes menthol, applied with a cotton-wrapped probe to the surface, considerable friction being used, may for a time control or even produce temporary improvement; but, in extreme cases, we have nothing that can equal frequent applications of cocaine, either alone or combined with iodoform and morphine.

Towards the end even this will have to be given up, and the exhibition of codeine and morphine are now, as ever, our only means of preventing unnecessary suffering.

Either as aids or as soothing measures, during a course of operative procedures and the later palliative stage of treatment, the va-

rious sprays, cocaine applications and inhalations, according to the exigencies in the particular case and the choice of the operator, are useful in conjunction, and can seldom be entirely dispensed with.

A case of interest in connection with this paper is that of Miss H. C., which came under our notice early last summer. Patient had been aphonic for two years.

The larynx was extensively involved, and a speedily fatal result threatened, not as much from the lung as from the throat affection, on account of extreme stenosis.

Not having Krause's set of instruments, we referred the case to a New York surgeon, who, however, only made a tracheotomy, and returned the case to us. She arrived here almost suffocated, and, upon examination by Dr. Von Ruck, it was found that the inner tube had been left out, and that a large mass of granulations projected into the laryngeal opening of the tube *in situ*, thus practically strangling the patient. The tube was promptly removed, as was also the mass of granulations, and subsequently matters went on so well that much of the swelling in the larynx subsided, the voice reappeared, and the tube could be dispensed with.

Some four months later the symptoms grew worse again, the stenosis returning, almost to the extent noted before tracheotomy. In the mean while a set of Krause's instruments had been procured from Germany, and the removal of the obstructing infiltrated swelling of both arytenoid cartilages and the ary-epiglottic folds was undertaken, as heretofore described. The lumen was extremely narrow, the masses entirely overlapping the cords. The breathing became very much better, even after the first operation, and now, after three operations upon each side, the cough, painful deglutition, swelling, and infiltration are very much improved, each removal of tissue being followed by prompt cicatrization and diminution of the swelling. There still remains upon the posterior wall below the cords a previously unsuspected proliferating tubercular mass, which the resulting contraction following the local application to it of cocaine shows is the only hinderance to the recovery of her voice.

At the time we began the operative procedures she had been readmitted, seeking the advantage of Koch's remedy, which Dr. Von Ruck was unwilling to apply under the condition of stenosis which was present.

Our efforts secured all the room required or thought requisite for the employment of the lymph, and we now wait its action upon the tubercular mass upon the posterior wall before attempting the there very difficult operation of its removal.

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*THE LITERATURE OF MEDICINE.**

By Schuyler C. Graves, M.D., Grand Rapids, Mich.

LADIES AND GENTLEMEN:—In the selection of a suitable subject for the annual address of the retiring president of our Society, I have deemed it fitting to choose that which, while not devoted to any of the specific subdivisions of the *ars medica*, would yet permit a broad, though, of necessity, a cursory, survey of the science and art of medicine, as viewed from a purely literary stand-point; in short, the literature of medicine,—its origin, its progression, its present status, and its future probabilities.

1. *The Origin of Medicine.*—What year witnessed the birth of medicine? How and where did it come into existence? Who was the first practitioner?

These are questions which are difficult of solution. But let us examine the matter more closely.

Passing through the mediæval ages without pausing, we find evidences of medical knowledge in the Roman civilization as far back as B.C. 200. Proceeding to the older civilization of the Greeks, whence Roman ideas mainly emanated, we still find the dissemination of medical facts. Going still further to the hoary antiquity of the early Egyptians,—B.C. 1000,—we find the medical art being practised, and there is authority for the statement that the Chinese medical code was in existence four thousand years before the birth of Christ.

Who, indeed, can prove that medical men did not thrive among their compeers in the civilization of the Platonic Atlantis, whose antiquity transcends to so great a degree that of hoary Egypt or venerable China.

The medicine-man of the American Indian has had handed down to him from foregoing generations the scanty medical knowledge which he possesses. Did it come originally from that self-same Atlantean civilization, or is it the empiric enlargement of an ancient, initial intuition?

* An address delivered before the Academy of Medicine of Grand Rapids, Mich., by the retiring president, Schuyler C. Graves, M.D., February 2, 1891.

All knowledge in regard to the origin of medicine must of necessity, therefore, be purely speculative. Medicine passes beyond the utmost limit of history, and merges into the fabulous era of prehistoric times.

There can be no doubt, however, that as long as man has been upon the earth, whether in a primitive or more developed state, disease has been a ravager, and if disease has existed, general remedies for the same, and the ability to manifest some discretion in their selection and use, have also obtained, call it knowledge, intuition, instinct, or what you will.

Observation of the lower animals teaches us the presence of a natural discrimination in certain emergencies. The domestic cat and dog, when in a state of health below par, and hence in need of certain reactive forces, show no hesitancy in going to the right plant for relief, not perhaps in all cases, but in a sufficient number to render evident the relation which exists between disease and instinct.

Can this instinct be limited to the animals specified?

What year, then, witnessed the birth of medicine?

I answer, the same year that witnessed the birth of primitive man, or, if we accept evolution, the same year that witnessed the birth of the first man-typifying and man-evolving organism.

How and where did it come into existence?

It came as the result of natural instinct which the Creator implanted in the animal organism at the start, and the place of its first manifestation was, of course, the location of the first instinctive animal.

Who was the first practitioner?

As instinct must have prompted the administration of the first dose, so the organism which gave expression to this instinct must have been the first practitioner. It may have been our ancestral clam. It may have been the first of primitive men.

2. *The Progress of Medicine.*—It is very evident to the most casual observer that, although we owe our start in medical knowledge to instinct, very few people of to-day would trust their lives, or the lives of loved ones, to the care of a physician who relied wholly upon the stock of instinct which nature had vouchsafed him.

This needs no comment, but it shows that medicine did not remain an instinctive practice. It grew; it developed.

Primitive medicine looked upon disease as an entity, an evil spirit, and those persons who had had experience in ridding the sick of their maladies being deified, temples were erected and priests ordained for the purpose of beseeching these canonized medical saints to cast out the evil ones. Later disease was supposed to be due to the anger of the gods.

For these two reasons, if for no others, there arose superstitious rites and incantations for the cure of the infirm, such as we know take place to-day in all sincerity among certain Indian tribes and in the negro settlements of Central Africa.

Thus we come to learn why the priest and physician were one and the same person in the times referred to, for medicine at that period was oracular, the authority for the superstitions and incantations being derived, through the agency of the medico-priests, from the oracles of the deities.

Superstitions, in one form or another, either in the guise of astrology, alchemy, or wild philosophical vagaries, continued to cling to medicine—that is, to civilized medicine—for many centuries, and the *ars medica* was not purged of them until the sixteenth or seventeenth century.

However, the first objects of sensible attention were cleanliness, hygiene, and the prevention, as far as possible, of contagion, and the first scientific remedies were regulation of the diet, application of water in shape of baths (hot or cold, impregnated or not with minerals), and decoctions of roots and herbs.

Later the sick were in the habit of lying by the wayside in order to receive attention and treatment from those of their fellow-creatures who had suffered from the same maladies and had been restored to health. Be it also known that no wayfarer was allowed to pass any sick person thus exposed on the highway without questioning him in regard to his infirmities.

When recovered, these patients were required to record in the temples their symptoms and the remedies used.

Thus grew up a vast storehouse of practical information on the natural history and cure of disease, affording a basis for modern pathology and therapeutics.

It will be interesting to relate in this connection that the faith which was reposed in the validity of this congeries of medical facts was so strong that any physician who followed the dicta therein contained was held in honor, whether death followed his dosing or not; but if he were detected in making any innova-

tions, or in departing to the slightest degree from the written law, he was punished with death, even if his patient made a perfect recovery.

In looking over the annals of Egyptian medicine, we find much that is interesting and instructive.

Specialists existed in those days. The eye, the ear, the teeth, the stomach, each had its own particular votary.

Dietetics, also, was carried to quite a degree of perfection, only *so much* of particular varieties of food being allowed.

As the Egyptians abhorred dissection, their knowledge of anatomy and physiology was of necessity very limited, as, for instance, the belief that the heart grew two drachms each year until the fiftieth, after which it decreased in the same ratio; but to say that they abhorred dissection does not at all express their feelings in regard to the sacredness of the dead human body.

Their ideas on this subject were so strong that they would curse and chase and pelt with stones the very men whose office was to remove the viscera from the body preliminary to the process of embalming, so that these unfortunates, for doing a most important, yea, an indispensable, as well as a religious act, were compelled to watch their opportunity, hasten through with their work, and then run for their lives.

We observe that by the system of recording medical facts and experiences practised by the Egyptians much was learned that was true. In short, a gain was made, and medicine progressed under early Egyptian nurture.

Let us now glance at medical knowledge and practice in ancient Greece.

About B.C. 1000 there came upon this world, either in fact or in fancy, that personage or mythological character known as Æsculapius, and called the god of medicine. Whether he really had an existence or not is a moot question. There is considerable doubt about it, but it is said that he lived, and that he was the father of many descendants, all the male representatives of whom practised medicine under the appellation of the Asclepiadæ.

"History repeats itself."

Romulus, the founder of Rome, was suckled by a she-wolf. Æsculapius, his illustrious predecessor, was suckled by a she-goat. Romulus had a foster-father in the person of a shepherd; so had Æsculapius in that of a goatherd.

In his treatment of the sick Æsculapius is said to have invoked the powers of the gods, and to have supplemented these invocations by a vigorous use of the medicines of the day,—decoctions for internal use and macerated herbs for external application in the arresting of hemorrhage and the soothing of pain.

In regard to the skill and success of Æsculapius as a practitioner, hear what Dunglison, in his "History of Medicine," culls from Pindar, the lyric poet of Thebes, concerning him:

"Those whom nature made to feel
Corroding ulcers gnaw the frame;
Or stones far hurl'd, or glittering steel,
All to the great physician came.
By summer's heat, or winter's cold
Oppressed, of him they sought relief.
Each deadly pang his skill controlled,
And found a balm for every grief.
On some the force of charmed strains he tried,
To some the medicated draught applied;
Some limbs he placed the amulets 'round;
Some from the trunk he cut, and made the patient sound."

Reference can be observed in this Pindaric strain to the invocations of Æsculapius, previously mentioned, and also to his treatment of wounds and ulcerations.

But now let us look more particularly at the general state of medicine in ancient Greece and its progress.

The medical art was at first hereditary, as touched upon before in the statement regarding the Asclepiadæ, and its secrets were not to be divulged. Knowledge was exceedingly limited, and ignorance correspondingly great. The recovery of a patient, for instance, was a monument to the professional skill of the practitioner; but his death was ascribed to want of confidence in the physician or to lack of obedience to the commands of the gods.

Anatomical knowledge in the time of Æsculapius was very contracted, the Grecian argument against the practical study of the dead being that, inasmuch as the soul after death was compelled to wander on the banks of the Styx until the earthly casement had received the rites of pagan cremation, all haste was to be made, as soon as a relative or friend had died, to dispose of his body after this fashion, and such action was looked upon as an imperative duty.

The ancient Greeks had a "divine old man," the so-called "father of physic," progressive Hippocrates. This medical savant, the second of that name, lived about B.C. 400; but he was far in advance of his age.

Hippocrates, considering everything about him and the time in which he lived, was a marvellous worker for the advancement of medical knowledge. He separated medicine from philosophy, and based it upon rational experience; he took that which was good from previous accumulations, and repudiated that which was bad; he started original investigation; he commenced practical work in anatomy by dissecting animals, chiefly the dog and pig, and then reasoned out human anatomy by analogy. His maxim was, "Nature, the first of physicians." His mistakes were many, but his path lay in the right direction. His works, quite a number of which have come down to us, may or may not be authentic, for, being traced first upon waxen tablets, transferred thence to the untanned skins of animals, thence to papyrus, and, finally, after the invention of the printing-press, to paper, we cannot tell how many interpolations may have been made, and hence are oftentimes unable to decide which is genuine and which spurious.

Passing along in Grecian history to B.C. 300, we find a physician, Praxagoras by name, who pushed medical knowledge a step nearer the truth by discovering the difference between the arteries and the veins; but he never even dreamed that these vessels contained blood. He only noticed that the arteries pulsated and the veins did not.

The word *artery* signifies *air-vessel*, and up to the time of Praxagoras this same word had been used to designate the trachea. Why did he apply it to one class of blood-vessels?

There are two reasons for this application. 1. The artery pulsated. This was supposed to be due to a vital force residing in the vessel-walls, and air at that time was considered the seat of vital force. 2. After death the arteries were always found empty, and hence to all appearances full of air.

About the time of Praxagoras (B.C. 300) the first human dissections were made by Herophilus, a Greek, under the sanction of Ptolemy Philadelphus and Ptolemy Euergetes, in Alexandria, which at that time was the centre of terrestrial knowledge; and this same Herophilus, by the way, discovered that the pulsations in an artery were not due to inherent vital force, but to the contractions of the heart.

Passing now to Roman medicine, we find that it was introduced by freedmen from Greece, who had picked up a little knowledge on the subject at home. Later better men filled the ranks, among whom may be mentioned Celsus, the medical Cicero, contemporary with Tiberius, and Galen, the Roman Hippocrates, contemporary with Adrian.

Not much difference is noticeable between Roman and Grecian medicine, and hence we move on to later eras.

Coming down to the seventh century (A.D.), we find medical schools established in England. In the eighth, the Arabic school began to flourish, and to the school of Arabia pharmacy and chemistry are indebted very much. Indeed, to so great a height, considering the times, did Arabic and Moorish medicine rise, that, as I have stated in a former paper, with the completion of the conquest of Granada by Ferdinand the Catholic, the Spanish peninsula, in consequence of the departure of the expatriated Saracens, was plunged into veritable scientific darkness.

Until the twelfth or thirteenth century the affiliation between priest and physician was kept up; but at that time (or thereabouts) monks were forbidden to practise the art of medicine both in France and in England, although the influence of the union was still observed in the fifteenth century, when physicians, after the manner of monks, were compelled to devote themselves to celibacy.

The pseudo-science of astrology was also connected with medicine even until the eighteenth century.

Illustrative of this connection, I quote from an old work in my possession, written by a Dublin physician in 1748.

Writing of a medical case in his practice, the doctor says,—

"Then I advised bleeding eight or ten ounces on the 7th of November; that on the 8th the purge should be repeated, *because the new moon was the next day;* for the eminent Dr. Mead and other skilful authors have rightly observed that these kind of diseases grow worse about that time."

The patient having been advised to take a course of sea-bathing, the doctor continues:

"After the fourth time of going into the sea he was much better, although *this night being full moon*, he grew a little worse;" but in time "he came from bathing daily brisker and stronger, and readier in expressing his words. Neither on the ninth (9th) of the month, *though the new moon was at hand*, had he any convulsions or trembling, or the least increase in any symptom of his distemper."

The time of the new or the full moon, it is thus seen, was supposed to be unfavorable to convalescence.

It might, also, at this juncture be interesting to quote a portion of a law governing the actions of medical men in France during this century.

"If a physician shall wound a man of noble birth, he shall pay a fine of one hundred sous; and if the gentleman shall die of the effects of the operation, the physician shall be delivered up to the relatives of the deceased, who may treat him as to them seemeth mete; but if it be a serf whom he has wounded, or caused the death of, he shall be made to restore another to the lord."

I have said before that the first human dissections were done by Herophilus in Egypt some three hundred years before the time of Christ. This is true; but the practical study of human anatomy was not kept up, later medical men, until the Middle Ages, gaining their knowledge of anatomy from the notes of preceding anatomists, Galen particularly, and also a few others, who had dissected numbers of the lower animals; but human dissections began to be made openly in the fourteenth century by Mondini de Luzzi, professor of anatomy at Bologna, who wrote a work on anatomy that was considered classical for two centuries.

It was at that time, and still is to-day, the practice of professors of anatomy to have their subjects dissected, in part, of course, prior to demonstration before their pupils, by persons known as prosectors, and it is strange to relate that the first prosectors were barbers' apprentices, who used their razors in the work.

From this as a starting-point we soon observe barbers in medicine. Perhaps, logically, it was reasoned that, insomuch as anatomy was the basis—the *a*, *b*, *c*—of surgery, and barbers' boys were employed in anatomical work, the full-fledged barber must have within his jurisdiction the art of the surgeon. At all events, for several centuries after the age of Luzzi barbers practised surgery, commencing with venesection and the administration of medicated baths, passing into wider fields, and some of them even acquiring the proud distinction of being barber-surgeon to the king.

The well-known barber-pole of to-day is but a relic of its master's former glory as a blood-letter, the white band typifying the constricting fillet and the red the blood, which poured forth its crimson flood at the lancet's touch. The union of scissors and bath-tub in the sumptuous tonsorial apartments of the modern metropolitan hostelry is likewise a relic.

These barbers, who, as a rule, were extremely ignorant, continued their association with medicine until the middle of the eighteenth century, when they were tabooed and relegated to the sole practice of the art of the *tonsor*.

The invention of printing in the fifteenth century did a great deal for the progress of medicine, and that of gunpowder did the same for the surgical branch of the art, although in a very different sense. Gun-shot wounds were something new. The ancients had seen nothing of such injuries, and hence, of necessity, were quite silent on this point in their medical writings.

On this account the surgeons of the middle ages, brought face to face with new surgical conditions, were compelled to depend upon their own ideas for proper treatment.

This, of course, developed the art considerably.

In the sixteenth century a final divorce took place between chemistry and alchemy, and the former from that time has rested upon a secure foundation.

The progress of medicine was very rapid during the two or three centuries which precede our own times, notable points in medical discoveries being confined to no single branch of medicine.

The discovery of the circulation of the blood in the early part of the seventeenth century by William Harvey, physician to James I. and Charles II., was a long step forward, and who can estimate the value of the thousands of lives annually saved by Edward Jenner's discovery of the protective power of vaccination in 1798.

But the march of medicine has not been unsullied by the encroachment of error and fraud. The tar-water of Bishop Berkeley as a panacea was popular for some considerable time. So also were the metallic tractors of Perkins, who thought that the application of pieces of metal over diseased tissues would work a cure.

For a considerable period of time the weapon-ointment, or what was about the same thing, the famous sympathetic powder of Digby, was used with supposed efficacy.

This consisted in the application of a healing ointment or powder *to the instrument which had caused a wound*, thus curing the injury.

Scott, in the "Lay of the Last Minstrel,"

according to Dunglison, refers to this ointment when he writes,—

> "But she has taken the broken lance
> And washed it from the clotted gore,
> And salved the splinter o'er and o'er."

The mind-cure, the faith-cure, Christian (pseudo) science, etc., I simply mention as examples of fraudulent systems of medicine. There may be strands of truth in some of these "pathies," but to tie to they are unreliable, to say the least.

Errors, however, do not, as a rule, last long. Like the blue-glass craze, they have their day, blazing perhaps with some brilliancy for a while, but finally fading away, after a longer or shorter existence, like a candle dying in its socket. They join the army of their predecessors, and become the relics of a more or less superstitious past.

3. *The Present Status of Medicine.*—Medicine existed once in a rudimentary state, as we have seen. Has it arrived at perfection to-day? Not at all; but, nevertheless, enormous strides, on progressive lines, have been made, and now, through present knowledge and the cumulative experience of the past, thousands of lives are annually saved that hitherto would undoubtedly have been lost.

Let us glance briefly at what invention has done for the science and art of medicine.

As the telescope has brought nearer and for more accurate study the worlds which move in their grand orbits about us, so (1) the microscope has revealed all the hitherto unknown wonders and facts connected with the "unseen universe" beneath us.

Through the microscope the ultimate structure of our bodies has been ascertained and the physical constitution of all the body-fluids also made known. Not only by this means has health been studied, but disease likewise.

Through the microscope scientific experts have been enabled to ascertain many of the true causes of disease and the conditions upon which an enormous array of symptoms depend.

This, it is needless to say, opens the way for a more rational, and thus a more successful, treatment of our infirmities.

(2) The laryngoscope throws light, by the hand of the skilful operator, upon any lurking disease of the throat or larynx. (3) The stethoscope gives us the ability, so to speak, to look into the body through the external walls, and witness what is going on in the darkened chambers within. (4) The clinical fever thermometer shows us the slightest change in the patient's temperature; and (5) the sphygmograph, an accurate record of variations in the pulse-rate. We have to-day (6) the ophthalmoscope, which makes the interior of the eye read like an open book; (7) Esmarch's bandage, for the performance of bloodless operations upon the extremities; (8) intubation apparatus, for use in suffocative forms of laryngitis; (9) mouldable splints, for fractures; and (10) the pneumatic cabinet, for obtaining atmospheric differentiation in the abbreviation of pulmonary troubles.

Hygiene, or sanitary science, is to-day much more systematic and efficacious than ever before, chemistry has advanced wonderfully, new remedies, some of great value, are being brought out, and balneology figures largely in the therapeutics of hyperpyrexias. Diseases are often prevented, and thus the necessity for a cure and the danger of a death summarily abolished.

In the matter of drugs, there has been a fear, for the last few years, that the natural supply of quinine would soon fall far short of the demand; but some energetic, scientific German chemist has succeeded in making quinia (or quinine) by synthesis, thus preventing any possibility of scarcity and keeping down high prices. I need only mention chloroform and ether, the now indispensable agents, which bring freedom from pain, and a condition of blessed unconsciousness to those suffering from the indescribable tortures and agonies to which we mortals are, alas! too often subjected. Shall I forget, in this God-given list, to mention the beneficent cocaine? Not so; for by its use the physician forces to speedy flight the pain incident to minor surgical operations without abolishing consciousness in the slightest. Vaccination, previously referred to, should not be omitted in this connection, for we of to-day can never be brought to a personal realization of the horrors which visited the citizens of the Middle Ages when grim-visaged smallpox stalked through the land, and banished, with unspeakable agonies, thousands upon thousands of prostrated and abandoned individuals "to that bourne from whence no traveller returns."

Even to-day the immortal Jenner is being duplicated in the noble Pasteur, of France, who, it is confidently believed, will soon rob that great scourge—hydrophobia—of its horrors; and, as I pen these words, the intelligence is flashed throughout the civilized globe that the illustrious Koch is offering hopes of

relief to a world stricken with that great white plague,—consumption.

Let us all fervently trust that these hopes may, indeed, be realized.

Even in our own Michigan those sturdy investigators, Shurly and Gibbes, are doing some very encouraging work in the matter of tuberculosis.

I will not detain you by more than a passing reference, under this heading, to what antisepsis, as understood by modern science, has done for surgery. The surgical maxim, *Noli me tangere*, is almost a thing of the past.

The cerebral, spinal, thoracic, and abdominal cavities are now freely opened and explored, with the result of saving many lives.

4. *The Future Probabilities of Medicine.*—Lines developed in the past extend more or less deeply into the future, and although we cannot accurately foresee the status of medicine in the centuries to come, we can, by noting the drift of the times, realize how certain facts and principles, at present but dimly outlined, will undergo more perfect development. For instance, the matter of hypnotism.

Hypnotism is not a new thing. The ancient Egyptians in their Apis worship, the Greeks at the Delphic shrine, witnessed hypnotic manifestations on the part of the priests and priestesses, so that when Frederick Mesmer, towards the close of the last century, astonished at first Vienna and then all Europe, he merely reapplied an ancient principle.

Science having taken hold of the subject, we find that the true principle of mesmerism, stripped of all chicanery, comes forth as the modern hypnotism. It has also been ascertained that the hypnotic state is not to be brought about by any so-called "fluid," or by any impression passing from the hypnotizer to the hypnotized. The condition is a subjective one, being brought on by the patient assuming a perfectly passive state, and permitting one or more of his senses to be impressed by appropriate agencies, as, for instance, keeping the eyes steadily fixed upon some smooth, shining object, or allowing the filaments of the auditory nerve to be saluted by a monotone, such as the sound of a tuning-fork or a gong, provided, of course, that the passiveness be all the time maintained.

But I do not propose going into this matter in detail. I merely wish to state that in the not far distant future I believe much will be done through the agency of hypnotism. Certain mental and physical ailments will, no doubt, be benefited, and some cured.

Operations will be performed while the patient is under its influence, and some enthusiastic disciples even assert that wickedly-inclined youths will in this way be brought back to the path of virtue. This matter, however, passes beyond the medical and into the moral.

The great fact of future life, in its relationship to medicine, at all events, is the development of sanitary science. More of prevention and less of cure. The physician of the future will be paid to keep people from being ill, and not to cure them after they have become ill.

Some one has said that this is the custom among the Chinese physicians, and, if so, China, with all her old-fogyism, is far ahead of the otherwise progressive Western nations.

Sewerage, drainage, water-supply will all be arranged excellently well. Garbage and dead human bodies will be cremated, earth burial thus becoming a relic of the past.

Even surgery will participate in the onward march, for by continual improvements in the manufacture of labor-saving and life-and-limb protecting machinery, accidents will become alarmingly scarce. In fact, when we consider what has been done in and by medical science during the past quarter of a century even, it is difficult to keep from falling into the dream of Bellamy when we gaze into the future.

Is the millennium to be realized? If yes, then so much the better for the world and so much the worse for the doctors.

In closing this address I cannot refrain from reading, as peculiarly fitting, a brief poem by Dr. Holmes, composed for the meeting of the National Sanitary Association in 1860. It is as follows:

"What makes the healing art divine?
The bitter drug we buy and sell,
The brands that scorch, the blades that shine,
The scars we leave, the 'cures' we tell?

"Are these thy glories, holiest art,
The trophies that adorn thee best,
Or but thy triumph's meanest part,
Where mortal weakness stands confessed?

"We take the arms that Heaven supplies
For life's long battle with Disease,
Taught by our various need to prize
Our frailest weapons, even these.

"But ah! when Science drops her shield—
Its peaceful shelter proved in vain—
And bares her snow-white arm to wield
The sad, stern ministry of pain;

"When shuddering, o'er the fount of life,
She folds her heaven-anointed wings,
To lift unmoved the glittering knife
That searches all its crimson springs;

"When faithful to her ancient lore,
She thrusts aside her fragrant balm
For blistering juice, or cankering ore,
And tames them till they cure or calm;

"When in her gracious hand are seen
The dregs and scum of earth and seas,
Her kindness counting all things clean
That lend the sighing sufferer ease;

"Though on the field that Death has won
She saves some stragglers in retreat;
These single acts of mercy done
Are but confessions of defeat.

"What though our tempered poisons save
Some wrecks of life from aches and ails;
Those grand specifics Nature gave
Were never poised by weights or scales.

"God lent his creatures light and air,
And waters open to the skies;
Man locks him in a stifling lair,
And wonders why his brother dies.

"In vain our pitying tears are shed,
In vain we rear the sheltering pile,
Where Art weeds out from bed to bed,
The plagues we planted by the mile;

"Be that the glory of the past;
With these our sacred toils begin;
So flies in tatters from the mast
The yellow flag of sloth and sin,

"And lo! the starry folds reveal
The blazoned truth we hold so dear:
To guard is better than to heal,
The shield is nobler than the spear."

STUDIES IN THERAPEUTICS—CACTUS GRANDIFLORUS.

By John Aulde, M.D.,* Philadelphia, Pa.

CACTUS GRANDIFLORUS is a remedy which has recently been brought prominently to the attention of the medical profession through the publication of a large number of reports from physicians;† and as these reports correspond so closely with my own experience with the drug, I have deemed them of sufficient interest to warrant the preparation of a synopsis.

Two preparations found in the market are the fluid extract and the tincture, both of which are freely miscible with water. According to my own observations and the reports of those who have used the drug, the dose of either ranges from 5 to 10 or 15 drops, although the dose of the fluid extract is not given at such short intervals as the tincture. Gregory, who has used the tincture for more than fifteen years, recommends 5 drops every two, four, or six hours, but the fluid extract need not be given oftener than three times daily. A new preparation, cactina, has lately been advertised in the journals, which is probably an evaporated fluid extract, as it is offered in the form of pellets. While it is quite possible to prepare cactus in this form, there are the accompanying dangers of defects, due to the method of manufacture, and it should not cause the rejection of the remedy should this new product fail to afford the results claimed for the other preparations.

Cactus is distinctly a cardiac tonic, free from the so-called cumulative action of digitalis, and less objectionable to the palate than either nux vomica or strophanthus. It carries with it no narcotic effects, nor does it produce any material constriction of the arterioles, while it appears to possess valuable properties in regulating the movements of the heart, whether the irritability be due to "nervousness" from reflex causes, or to the presence of organic changes, features which will be developed more fully in the course of this review.

The remedy has proven serviceable in the treatment of dilatation with hypertrophy, accompanied by a murmur, in which case we may assume that the dilatation had increased more rapidly than the hypertrophy. In cases of palpitation, such as frequently occurs as a sympathetic functional disorder due to uterine troubles, or that which is a factor in indigestion with a relaxed (flabby) condition of the system, in which formication is a prominent symptom, cactus is indicated. These patients, when females, often complain of menorrhagia or metrorrhagia, and usually suffer more or less at the catamenial period. While cactus may be useful as a temporary expedient, it should be conjoined with other treatment directed to the stomach and the uterus. Thus, in the case of a disordered condition of the stomach, it may conveniently be combined with the digestive ferments, instead of strychnine or nux vomica.

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* Member of the American Medical Association; of the Medical Society of the State of Pennsylvania, etc.

† "The Pharmacology of the Newer Materia Medica." George S. Davis, Detroit, Mich., Part IV., February, 1890.

℞ Ext. cacti grandiflori,
Tr. nucis vomicæ, aa ʒii;
Liq. pancreatin., q.s. ad., fʒiii. M.
Sig.—One teaspoonful *with* meals.

Where we have to deal with metrorrhagia and other uterine affections, it may be safely and advantageously added to a prescription containing cimicifuga, ergot, or, in the case of leucorrhœa and endometritis, with or without subinvolution, it will be found beneficial to alternate it with calcium sulphide, to which should be added local treatment in the form of medicated tampons.

℞ Ext. cacti grandiflori,
Ext. cimicifugæ,
Ergotæ (normal liquid), āā fʒii;
El. aurantii,
Glycerini,
Aquæ partes æquales ad., fʒiii. M.
Sig.—One teaspoonful every four hours.

Not infrequently in young women, and in those who are married, we meet with palpitations which appear to be purely nervous, where it will be found that digestion is at fault, manifested usually by insomnia, although they take their meals regularly. In these cases diet must be regulated and certain objectionable food-substances prohibited, generally the starchy and fatty foods and sweets. Moderate exercise must be insisted upon, and proper attention given to the functions of excretion. If the skin be dry and harsh, the indications may point to the use of arsenic, rhus toxicodendron, or pilocarpine, all of which favorably modify digestion, while they promptly influence the activity of the skin.

In the case of dilatation, with anasarca and œdema of the extremities, with or without valvular disease, when there is apparently no sufficient reason for the persistence of the disorder, and when digitalis, diuretics, and cathartics fail to produce improvement, cactus promises to effect good results. This is the class of cases in which Bartholow recommends the employment of arsenical preparations, and occurs for the most part among persons advanced in years, where there is more or less atheromatous degeneration present, and where alcoholic preparations of digitalis result finally in bringing on sudden collapse and death. An examination of the urine shows an absence of albumen, although the specific gravity may be low, but, as a rule, the signs are negative. Here evidently is an indication for the addition of cactus to the arsenic, and, if there be a demand for catharsis, we have in apocynum an admirable remedy.

℞ Ext. cacti grandiflori, fʒii;
Fowler's solution, gtt. xxxvi;
Tr. gentianæ comp., q.s. ad., fʒiii. M.
Sig.—One teaspoonful in water every four hours.

Dr. O'Hara has reported several cases of hypertrophy, with dilatation and mitral insufficiency, in which cactus proved efficient after the failure of digitalis and other drugs. Dr. A. Orlando Jones (*Brit. Med. Journ.*, 1890) thinks cactus best adapted to the asthenic conditions, while he approves of digitalis in sthenic cases. Byrd recommends its use in subacute and chronic rheumatism, and in these instances it will be found advisable to combine it with rhus toxicodendron or with cascara when there is a distinct indication for the employment of a laxative aside from the action of the drug upon the heart. The value of cimicifuga should not be overlooked in these cases, as it will prove an acceptable adjuvant to cactus, and, besides, actæa is a useful drug in nearly all forms of rheumatism.

℞ Ext. cacti grandiflori,
Ext. cimicifugæ, aa fʒiss;
Tr. rhois toxicodendri, gtt. viii;
Glycerini, fʒss;
Tr. xanthoxyli, q.s. ad., fʒiv. M.
Sig.—Two teaspoonfuls in water after meals.

The cardiac irregularity and exhaustion due to morphine or chloral is promptly met by cactus. When these drugs are suddenly withdrawn from those accustomed to their use, it will be advisable to combine with the cactus moderate doses of fluid extract of coca and strychnine, and in quite a proportion of the cases the addition of cannabis indica will prove serviceable. Cases of sexual exhaustion are remarkably benefited by the exhibition of cactus, doubtless because it lacks those peculiar stimulating properties which it is so important to avoid. We are beginning to learn and understand that overstimulation is always followed by a period of depression. The action of cactus in these cases may be appreciably increased by the judicious exhibition of nux vomica, damiana, and phosphorus.

℞ Ext. cacti grandiflori,
Tr. nucis vomicæ, aa fʒii;
Ext. damianæ, fʒiv;
Glycerini,
Tr. gentianæ comp., āā q.s. ad., fʒiii. M.
Sig.—One teaspoonful after meals.

We are often confronted with patients who suffer from exhaustion, with irregular or intermittent pulse, due to the abuse of tobacco, and here, instead of unpalatable remedies like

nux vomica, we have cactus, which is rather agreeable than otherwise to most persons, and the effect upon the system and the circulatory apparatus is quickly apparent. The patient should take 5 to 10 drops three times daily. The same treatment is indicated for the relief of a similar condition, which often affects those accustomed to the inordinate use of tea. The active principle, theine, it has been found, will cause the heart to intermit, but in cactus we have a drug which meets this emergency, although I do not hesitate to say that the use of tea should be discontinued, and coffee or coca substituted.

The intermittent heart from the abuse of tea, accompanied by indigestion, with flatulency due to fermentation of food, may be greatly benefited by the alternation of gelsemium with cactus, with a view to relieve undue tension and favor the re-establishment of the secretions.

Gregory, of Yreka, Cal., believes cactus to be more valuable than digitalis where dilatation has outstripped hypertrophy, and says it is the only remedy he uses in functional valvular disease.

Engstad, of Grand Forks, Dak., says, "I now depend upon it [cactus] in preference to digitalis in functional disorders," but complains that many of the preparations are unreliable (THERAPEUTIC GAZETTE, September, 1890). He records its successful employment as a cardiac tonic in typhoid fever after the failure of strychnine and digitalis, and my own experience confirms his report.

Although aware that digitalis preparations enjoy a well-merited reputation for the relief of heart-troubles, I am of the opinion that many of the cases of sudden deaths from "heart-failure" may be traced directly to the injudicious employment of the drug; and I think the medical profession will hail with delight the appearance of a remedy which will in a great measure take its place, and bespeak for cactus a favorable reception and careful study.

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REVULSIVE MEDICATION.

BY HUBBARD M. SMITH, M.D., VINCENNES, IND.

YOUR editorial on "Counter-Irritants," in the January number of the GAZETTE, is one of interest and timely in this age of progress in the healing art; especially does it seem so when old-time methods are ignored and esteemed as mistakes of a past age. Although you do not espouse the views of the old fogies or the progressives of modern medical science, the concluding sentence embodies the central thought of the controversy when you say, "Experience rather than fine-spun theories must still decide the matter."

Theories are but theories, not facts, and are being overturned every year. One fact, proven by varied experience, is worth many theories, however plausible and seductive to the philosophic mind. The assertion that pneumonia is caused by a microbe has not been demonstrated satisfactorily. That microbes may be found in the sputum of patients suffering from pneumonia may be admitted, but that they cause the attack is another question. The lungs having become congested, and then inflamed by cold and moisture, would offer a fit soil for the microbe to vegetate in. Reasoning upon this subject, if it is admitted pneumonia is caused by a contagious microbe, we would have to admit that rubefacients and blisters would have little or no effect in arresting or curing the disease. But when a vast experience is brought to our aid to show that the disease may be beneficially affected by mustard, and other rubefacients and vesicants; nay, if applied early, with auxiliary treatment, may be aborted, then we must conclude that theory must stand aside for uncontroverted facts. That all internal inflammations can be beneficially influenced by rubefacients and vesicants applied over the seats of the disease cannot be successfully denied. For many years I have treated successfully inflammations of the internal organs with the free use of mustard as a prime auxiliary, and the benefit following its application is so universally appreciable that to my mind doubt is out of the question.

In catarrhal troubles with children, especially of the chest, I have found counter-irritants a sheet-anchor in the first stage of the disease. The assertion of the opponents of this course, that they are "useless," even "injurious," and "augmenting fever and suffering," is purely imaginative and bordering on a sickly sentimentality. Often have I been called to the bedside of little sufferers with congestion of the lungs, evidencing pain at each respiration, which was short, with great restlessness and fever, when they have been soothed to a sweet sleep in half an hour or less by a jacket of mustard-cloth, often sinking to sleep while the mustard was on them. To say that such treatment was cruel, useless, and calculated to augment fever is to

assert that which experience demonstrates not to be true. Two years ago I was called to see a brother physician who was suffering greatly from pneumonia and enlarged liver, and he had obtained no rest nor relief. I ordered a mustard-plaster large enough to envelop chest and extend partly over the abdomen. He expressed himself afterwards that the mustard treatment was a revelation to him; its influence was so prompt and marked that he abandoned his theories about rubefacients and blisters for substantial facts. One trouble with the profession as well as the laity in the use of these agents is that they are too sparing with them. To be of material benefit, large plasters must be used, and for effect, not merely pretence in a routine way. I confine my remarks in this article as referring mostly to children. When the child is very young, when I have occasion to use mustard, I order two tablespoonfuls of the strongest mustard (ground) to a pint of boiling water, and then have a cloth, sufficiently large to envelop the whole chest, dipped in this and wrung out so as not to drip when it is wrapped around the child, and a warm, dry cloth is placed over; better if a rubber cloth or oiled silk is used. This application is repeated soon again, unless the surface is very red; and when the redness begins to fade the application is repeated. In many cases the congestion never eventuates into inflammation under this treatment, and soon the patient is convalescent. If this plan be pursued early and rigorously, blistering seldom becomes necessary. But in adults, even when the inflammation was passing through its stages, when the patient's case seemed in a balance, and when suffering was acute, I have witnessed quick and permanent relief follow a large blister, followed with an emollient poultice.

This is a part of my testimony in favor of rubefacients and blisters, after nearly fifty years' experience.

A NEW METHOD OF INDUCING PREMATURE LABOR.

Dr. Schrader, of Hamburg, publishes in the *Centralblatt für Gynäcologie* a method of inducing premature labor based on his observations that cold is a greater excitant of the nervous, and consequently also of the muscular, system than warmth. Continuous irrigation at the temperature of 45° F. is impracticable, on account of the pain it causes, but a cold douche, alternating with a warm one, can be borne. Dr. Schrader connects a vaginal glass tube by means of a T-shaped piece and the necessary india-rubber tubes to two irrigators, one of which contains the cold and the other the warm water. By allowing now one instrument and now the other to work, cold or warm water may be sent through the vaginal tube into the vagina. Two people are required,—the one to fill the irrigators, the other to work the douche. For each sitting about twenty-four litres of cold and half the quantity of warm water at 112° are required, and the douche has a fall of about one metre and a half. The irrigation begins with the warm current, and before the cold water is turned on pressure is made on the perineum with the vaginal tube, so as to allow all the warm water to run away from the vagina. The same plan is observed before the change from cold to warm, by which means the alteration in the temperature, as felt by the patient, is always sudden. Each time about two litres of cold and half the quantity of warm water are used. The douche is generally repeated about every hour and a half until labor is active enough to make its continuance probable. Of eighteen women treated by this method exclusively, and four others who were partly so treated, one died of eclampsia twelve hours after delivery, but all the others made a good recovery. The eighteen women who were treated by the douche exclusively had twenty children, of whom fifteen—that is, seventy-five per cent. —were alive. These cases required on the average ten douches and a half; in half the number three douches and a half were sufficient.—*Lancet*, March 21, 1891.

THE THERAPEUTIC ACTION OF MONESIE BARK.

As is well known, monesie bark contains considerable quantities of saponine and tannic acid, and Dr. P. Rosanoff (*Journal de Médecine de Paris*, March 22, 1891) has made use of a watery extract of this substance as an expectorant and astringent in various diseases of the respiratory and alimentary tract, where its astringent properties serve to render it free from the disturbance of general digestion, which is so apt to follow the use of ipecac, senega, etc. In fact, it is even said to be useful in the treatment of chronic diarrhœa, and is especially indicated in chronic troubles of the respiratory organs where there is at the same time more or less digestive disturbance.

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Leading Articles.

NATURE AND TREATMENT OF DIPHTHERIA.

II.

PROBABLY no disease is the subject of more general interest to physicians than diphtheria, as none is a more favorite topic of discussion at medical meetings. Recent bacteriological researches, as detailed in the GAZETTE for March, 1891, have wonderfully advanced our knowledge of its etiology, while the therapeutics of diphtheria have hardly kept pace with this progress. The remedies proposed are legion, but all too poorly fulfil their end, and the mortality from this disease still remains very high. We are still without a specific, though the profession is looking for one; but physicians are learning more intelligently to combat diphtheria, and the gains which prophylaxis has made are great.

Under the head of the nature of diphtheria, there are two points to consider,—1, the question of its microbial region; 2, whether it is primarily a local or a general disease.

1. Till within a few years, nothing definite has been known about the contagion of diphtheria. There is now a growing disposition to accept as substantiated the claims alleged in behalf of the Klebs-Lœffler bacillus, especially in view of the recent confirmation of these claims by Roux and Yersin, of Paris, also of Drs. Abbot and Welch, of Baltimore. This bacillus is about as long as the tubercle bacillus, and about double the diameter of the latter; its extremities are rounded; it is immovable; it forms groups of chains, each element of which becomes club-shaped at its extremity. It is found exclusively in cases of diphtheria, in or beneath the false membranes; has been in vain sought in the blood and viscera. Culture experiments, made first by Lœffler in 1884, subsequently by Roux and Yersin, appear to have been successful; and with the product of pure cultures, the disease in all its essential features—not even the secondary paralysis in the experiments of the French bacteriologists being lacking—has been reproduced in animals. These experiments have been in part confirmed by Kolisko and Paltauf, of Russia, and by Drs. Welch and Abbot, of the Johns Hopkins Hospital; the latter have noted the invariable concomitance of the Klebs bacillus with the false membranes of true diphtheria. Other associated microbes, which doubtless have a *rôle* in the necrotic phenomena, have been observed in diphtheritic membranes, notably the *streptococcus diphtheriæ* of Prudden, which seems to be identical with the streptococcus erysipelatodes and the streptococcus pyogenes. Prudden, in fact, assigns to this micro-organism the principal part in the production of false membranes.

2. With regard to the second question, while there is not yet unanimity among the authorities, there seems to us to be *preponderant* evidence that diphtheria is primarily a local disease, the microbe (whether that of Klebs and Lœffler, or some other microbe) first causing a local inflammation, necrosis, and fibrinous exudation, then elaborating in the false membranes a peculiar poison,—a toxalbumen,—which is absorbed, infects and prostrates the organism.

It is true that there are difficulties attending this view in its application to all clinical cases; the gravity of the phenomena of infection is not always in proportion to the extent of the false membranes, and with an inconsiderable amount of local lesion the patient may from the first be overwhelmed by the

toxic accidents. Cadet de Gassicourt makes much of this argument, and classes such cases under the head of "diphtheria of hypertoxic form." On the other hand, it is equally true that there are benign cases where, with well-defined patches of false membrane covering considerable areas, the constitutional symptoms are trifling and almost *nil.*

There seems to be no better way to arrive at a true conception of diphtheria than by pathological experimentation, the results of which always bear out the view above stated *of a primarily local origin of the disease.* We have no space here for a statement of facts such as Oertel has given in his article on "Diphtheria," in the first volume of "Ziemssen's Cyclopædia," and which show conclusively that diphtheria, when induced in animals by the inoculation of bits of false membrane, is always at first local, fixing itself at the point of infection, *and thence radiating inwardly.* In harmony with this induction is the experience of Roux and Yersin with the soluble filtrates of diphtheritic cultures, which, injected in animals, produce septic accidents identical with the general constitutional effects of diphtheria in man. In accord with this doctrine, we may explain the grave, hypertoxic cases as cases of unusual susceptibility to the disease, where the poison, though coming from only a small centre, was rapidly absorbed, and met with but feeble resistance. In the *benign* cases alluded to, though the diphtheritic focus was of considerable extent, either the conditions for the elaboration and absorption of the poison were unfavorable, or the vital forces of the organism were peculiarly resistant to its influence; in fact, we are not without analogies which will enable us to understand such cases, in conformity with the view that diphtheria is primarily a local disease.

The treatment of diphtheria will naturally vary somewhat in accordance with views held as to its being primarily a local or a general disease. Those who believe in a primarily local origin will naturally have a strong interest in destroying *in situ* the morbid germs before they have had time to generate their virus and poison the organism. Under the other theory, the indication to promote local antisepsis and limit the spread of false membranes is equally recognized; but he who regards the diphtheritic *plaques* as only the expression of a general disease, bearing the relationship to the latter which the scarlatinal angina bears to scarlet fever, will not so strongly insist on energetic local treatment as he who looks upon the local lesion as the centre of the infection. Those, doubtless, that hold to the latter view have the most sanguine expectation that a specific will yet be discovered which, applied in time to the morbid focus, will nip the disease in the bud.

Certainly the results of the cauterization treatment, carried out with the intent of destroying the microbe *in situ*, have not been remarkably successful, unless we except the apparently favorable experience with carbolic acid and with phenicated camphor of Archambault and Gaucher, at the Hôpital des Enfants Malades; of Soulez, of Romorantin; of Sevestre, at Hôpital Trousseau; and of Dubousquet-Laborderie (vide *Bulletins et Mémoires de la Société de Médecine Pratique*, January 15, 1889). The method of these writers has been so highly vaunted that it deserves mention. The phenicated camphor is made as follows (we take the formula as given by Sevestre):*

℞ Camphor, 20 parts;
Castor oil, 15 parts;
Alcohol, 10 parts;
Crystallized phenic acid, 5 parts;
Tartaric acid, 1 parts.

Dissolve the phenic acid in the alcohol, add the camphor, then the tartaric acid, and finally the oil.

Gaucher applies this preparation in the following way:

"The mouth being widely opened and the tongue depressed, the operator will carry the swab charged with the liquid into the back part of the throat, applying it to the tonsils or other parts that are covered with false membrane. He will rub vigorously the diseased surface, in order to detach and remove the diphtheritic membrane, which will come away in *débris* or flakes. After each rubbing, the swab should be washed in a carbolic solution. These frictions should be repeated several times at each *séance* till all the white patches have been removed or destroyed. A final application with the swab dipped in the caustic will be made to the throat, in order to touch all the surfaces which have been denuded and despoiled."†

This operation is repeated morning and evening and in the interval of the cauterizations; large irrigation-injections are made every two hours into the throat by means of

* Sevestre, "Études de Clinique Infantile," 1890, p. 210.

† *Bull. et Mém. de la Soc. de Méd. Pratique*, January 15, 1889.

a fountain syringe of a 1 to 100 carbolic solution. The pain of the cauterizations is sometimes very great, but may be mitigated by previously spraying the throat with a cocaine solution.

Despite the fact that signal and unparalleled success is claimed for this treatment (see statistics of Gaucher, Legendre, Dubousquet), it will not be likely to come into favor on account of the painfulness of the cauterizations, the swelling which follows them (which necessarily hinders deglutition), and the difficulty, if not impossibility, of application in young children. Theoretically, this method is excellent; practically it demands for its execution a pitiless hardihood which few physicians possess. It is doubtful if in private practice the results would ever be even approximately as good as the French writers claim. The method of cauterizations is an old method, dating back to the times of Bonsergent, who cauterized the throats of young children with a red-hot iron, and Bretonneau, who did not even originate, but who borrowed from physicians of a past age a practice which consisted in swabbing out the diphtheritic throat three or four times a day with fuming hydrochloric acid. Trousseau, Rilliet and Barthez, and others adopted substantially this procedure, using muriatic acid, saturated solutions of nitrate of silver, sulphate of copper, etc., forcibly removing false membranes where they could, and cauterizing the denuded surfaces.

It is needless to say that the method of cauterizations, as formerly advocated by this school, has been deservedly pronounced a failure, and is now a thing of the past. Cauterization, as Cadet de Gassicourt says, does not prevent the patches from forming anew; it causes pain and dysphagia, and the more the derm is denuded, the more the extension of false membranes is increased and promoted.

It may, however, be said, in defence of the later method proposed by Gaucher and his colleagues, that it is less severe than the methods of Bretonneau and his school, as phenic acid is comparatively a mild caustic, and, in the diluted form in which it is used, effects little destruction of tissue, while being nocuous or destructive to the microbes. It may well be, as these writers claim, that, in cases of adults where this heroic treatment can be properly carried out, it may save life where other methods fail, due pains being always taken to keep the throat well disinfected in the intervals of the cauterizations by means of antiseptic sprays and irrigations. It is true that most authorities condemn all interference with the false membranes till they are separated from their attachments, and can be removed without violence to the parts beneath them.

Other aspects of the treatment of this disease will be taken up in another number of the GAZETTE.

THE TREATMENT OF ANÆMIA.

IN the treatment of anæmia, the *indicatio causalis* should be predominant. If the cause be hemorrhages, these should be stopped by internal and external styptics, by compression, by ice, ergot internally, etc. If profuse discharges (as prolonged suppuration) be the cause, such constitutional and local measures should be resorted to as will diminish or arrest them. Under this head come cold abscesses, bronchorrhœa, cystitis with copious muco-purulent exudation, chronic diarrhœa. Excessive lactation and excessive venery act in a similar way. While these inordinate wastes are going on, the blood is being spoiled of its richest elements,—its corpuscles and its plasmatic albuminates,—and any treatment to be efficacious must reduce to a minimum these losses.

If the cause be syphilis, tuberculosis, cancer, the causal indication is sufficiently plain. The victim of venereal disease may get rid of his anæmia and regain a fair measure of health and vigor under the reconstituent and antisyphilitic influence of mercury and potassium iodide; the tuberculous patient may improve by an out-door life and a fortifying regimen generally; even the subject of cancer may be, for a time at least, benefited by medical or surgical means directed to his morbid condition.

The anæmia may be of toxic origin, being due to malaria, to poisoning by lead, by phosphorus, by mercury, etc., and the treatment will be addressed to such of these agencies as may be found to be operative in the particular case.

It would take up too much space here to enumerate all the causes of anæmia and follow out the indications. In idiopathic anæmia one of the most fruitful causes is insufficient food; then want of light and air, excessive bodily exercise, intense heat or cold, depressing emotions, are all important etiological agencies, and, when once recognized, will suggest the only successful means of cure.

Anæmia, moreover, besides being symptomatic of hemorrhages, profuse discharges, severe cachexiæ (as before mentioned), may arise from obstacles to taking food (as in stricture of the œsophagus), to dyspepsia, to organic disease of the heart, to chronic pulmonary disease, to fever, to dyspepsia, and, finally, to disease of the blood-making organs (lymphatic glands, spleen, marrow of bones). Anæmia originating in any of these ways can be successfully met only by attention to etiological therapeutics.

One of the most common forms of anæmia is that which is symptomatic of severe and prolonged dyspepsia, and for its removal demands a knowledge of the kind of dyspepsia,—whether atonic and functional, or the result of chronic catarrh, dilatation of the stomach, round ulcer, etc,—and the means, dietetic and remedial, to be employed for the restoration of the damaged digestive functions.

The anæmia of heart-disease is, of course, curable or incurable, according to the nature of the cardiac affection to which it belongs. Digitalis, strophanthus, nitro-glycerin, caffeine, adonidine, more than iron and arsenic, are indicated in this anæmia.

In the absence of any yet definitely known pathological lesions causative of chlorosis or of pernicious anæmia (although the theory which assigns both maladies to disease of the hæmatopoietic organs appears to be the most plausible), it is impossible as yet to fulfil the *indicatio causalis*, and we must content ourselves with attending to the *indicatio morbi*. In fact, in all kinds of anæmia this indication imposes itself upon the practitioner. To promote sanguification in all forms of anæmia, we rely on two orders of remedial agents,—medicinal and hygienic.

To take up, first, the medicinal means (though these are by no means the most important), there is still no medicine of such general utility as iron. It is true that we are still ignorant of the precise way in which iron does good, but the fact is none the less indisputable that in a multitude of cases under the influence of this agent the blood improves in corpuscular richness, and all the nutritive energies are augmented.

The ferruginous preparations are legion, and we believe, with Niemeyer, that special indications for the exhibition of one or the other of them cannot yet be laid down. In simple anæmia and in chlorosis almost any of the iron preparations are well tolerated, but in special cases it is necessary to select that kind which agrees best with the stomach. The citrate, tartrate, lactate, pyrophosphate, the reduced iron, Blaud's pill, the chloropeptonate are all mild preparations which are generally borne by weak and delicate stomachs. The tincture of the chloride (the most used of all the liquid preparations) sometimes acts with marvellous promptness and efficacy, but many patients cannot take it, and not every pharmaceutical product is reliable. Where iron alone does not agree, it may sometimes to advantage be associated with other medicines. Thus, the combination with aloes or aloin is especially valuable in many cases of anæmia or chlorosis with constipation. A favorite pill contains of dried sulphate of iron and extract of aloes of each one grain. To this is sometimes added for each pill one-quarter of a grain of nux vomica, a little capsicum, or one-thirtieth of a grain of arsenic. Dr. Julius Pollock urges the addition of a little rhubarb to the dose of iron in disordered states of the stomach. A combination which we have sometimes found efficacious is—

℞ Pulv. rhei, gr. ii;
Ferri carb. saccharat., gr. x;
Pulv. calumba, gr. v.
M. Ft. pulv. no. 1.

A pill much prescribed by Vulpian in anæmia and chlorosis (*Clinique Médicale*, p. 470) consisted of iron by hydrogen, soft extract of cinchona, pulverized rhei, of each equal parts; this was called the compound iron pill of Charité Hospital. The late Dr. Gueneau de Mussy (*Clinique Médicale*, t. i. p. 209), whose success as a practitioner is well known, was fond of a combination of bismuth with iron, and where the latter, despite the addition of bismuth, still produced irritation of the digestive organs, he did not hesitate to add a little opium or belladonna. This writer urges that it is not by furnishing to the blood an element that is wanting that iron does good, but by stimulating nutrition, and points to the fact that etiolated plants become green by watering them with ferruginous preparations, and at the same time their chlorophyll does not contain any iron.

Huguenin, of Paris, was one of the first to propose the hypodermic method of administering iron, especially in pernicious anæmia, where iron, when taken into the stomach, is not assimilated; and Dr. J. M. Da Costa, of Philadelphia, has used the dialyzed iron to advantage in this way. From 5 to 30 drops

daily may be injected under the skin without fear of abscess.

Arsenic has of late been highly extolled as a remedy in anæmia, especially in pernicious anæmia, and is said by excellent clinical authorities to merit a place next to iron; in fact, in many cases it does good where the martial preparations utterly fail. Drs. Byrom Bramwell, Mackenzie, Lockie, of England, have advocated the more free use of arsenical preparations for a tonic and hæmatinic effect. The latter, in the *British Medical Journal*, December 7, 1878, affirms that in many cases of anæmia approaching the so-called essential or pernicious anæmia, arsenic will confer more benefit than any other remedy. Dr. Wm. Osler, in the *Boston Medical and Surgical Journal* (vol. cxix. p. 454), reports remarkable results in puerperal anæmia from the continued administration of Fowler's solution, and reviews the history of the employment of arsenic in pernicious anæmia, and calls attention to the fact that we do not fully understand the reason why this drug should be so useful in some cases and so useless in others. It certainly has often the effect in profound anæmia much resembling that of a specific; like that of quinine in ague for instance. The initial dose should be 5 drops, gradually increased to 20 or 30 drops, three times a day. Puffiness of the eyelids, œdema above the eyebrows, vomiting or diarrhœa, indicate that the drug should be suspended for a time. The point of greatest importance is that this remedy should be given a long time and in increasing doses.

Other remedies, as phosphorus, manganese, cod-liver oil, malt preparations, alcohol, find their application in certain cases. Cod-liver oil is more readily oxidizable than any other fat, and when tolerated often constitutes a powerful auxiliary to other means of treatment. Alcohol, in the form of wine or ale, and sometimes where there is great debility, and especially in that anæmia which attends febrile diseases in the form of brandy or whiskey, frequently proves of aid in stimulating the functions of digestion and assimilation, and preventing inordinate waste.

But the hygienic treatment, which comprehends dietetics, exercise, hydrotherapy, aerotherapy, and climatotherapy, attention to rest, the restoration of normal habits of sleep, the rigorous avoidance of all excesses, of all injurious excitements, of depressing emotions, etc., is of far more importance than the medicinal treatment.

Hydrotherapy is a powerful stimulant of nutrition, and is commended by Fleury, Dujardin-Beaumetz, Becqueril, and others as one of the most active agents in the treatment of anæmia. The douches should be as cold as can be well borne, and should be very short at the commencement,—of not more than five or six seconds' duration.

The utility of out-door exercise, of sojourn in the country or at the sea-side, of mountain life, is sufficiently obvious as being among nature's best and most certain means of reinvigoration. Many cases of anæmia and chlorosis are due primarily to sedentary habits, to breathing hot or impure air, and to neglect of exercise. Without an entire change in the habits of living (due rest, sleep, and abandonment of every degrading, depressing passion being observed), the dietetic treatment of anæmia can do little good.

The dietetic treatment is, of course, the most essential, for it is only through the assimilation of food that we can hope for restoration. On this subject we must be very brief, as this article is already too long. As a general rule, food for the anæmic should be abundant, nutritious, and easily digestible. There should be predominance of albuminates (milk, eggs, meats, fish) over carbohydrates. Some patients will do better on light meals given frequently, others on not more than two meals a day. For patients with feeble digestive powers, beef peptones, underdone meats—even, for a time, pancreatized milk—may be necessary.

Some bad cases of anæmia and chlorosis do remarkably well on a dietetic system by stuffing, like that recommended by Dr. S. Weir Mitchell in his little treatise on "Fat and Blood." This is combined with much passive exercise by massage and electricity.

Gavage, or forced feeding, performed by the œsophageal tube, gives often brilliant results in certain anæmic conditions where it is impossible sufficiently to nourish the patient by mouth, but where food of a proper kind when introduced into the stomach is well digested and assimilated.

Some of the most discouraging cases are those that are attended with absolute repugnance to all food, as is often witnessed in pernicious anæmia. Medicines do little towards restoring appetite and digestion, and unless the physician can obtain hints from etiology and enforce the proper hygiene, he is powerless to benefit his patient.

THE ACTIVE PRINCIPLES OF PARSLEY.

IN modern as in ancient times parsley (*Petroselium sativum*) has enjoyed a certain reputation as a carminative, diuretic, aphrodisiac, and emmenagogue. Analyses by various investigators have shown that parsley contains a volatile oil, to which it mainly owes its odor and taste, and two indefinite substances, to which the name of apiin and apiol, the latter especially being supposed to be the active principle, have been given. Apiin appears to resemble pectic acid, while apiol is a yellowish oily liquid, not volatile, heavier than water, of peculiar odor, and acrid taste; is very inflammable, insoluble in hot or cold water, but very soluble in alcohol, in ether, and in chloroform. It has, however, been shown that the commercial apiol is merely the oleoresin. Although parsley has formed the basis of a number of chemical investigations, and several so-called active principles, in addition to those above mentioned, have been apparently isolated, no systematic study as to the physiological action of this plant has been published. Recently, however, Drs. Mourgues and Laborde have undertaken a series of experiments with a number of different products isolated from the parsley, and their results are published in *La Tribune Médicale*, Nos. 2, 3, and 4, 1891. Their experiments were made, in the first place, with a substance termed cariol, a new principle isolated by Dr. Mourgues from the parsley-seeds, but of whose chemical properties, however, no account was published; second, with a mixture of cariol and apiol; and, third, with crystallized apiol made by the process of Gerrichten. A comparison of the results reached with these different principles showed that the crystallized apiol is most poisonous, and yet at the same time absorbed with the greatest difficulty, and is consequently not available for therapeutic purposes. The apiolin of Chapoteaut seems to be the one which is most active, while at the same time being freest from disadvantages. This substance is prepared by exhaustion with light petroleum ether, the resulting liquid then being distilled, and the residue exhausted with alcohol. The alcoholic solution on evaporation gives a product which, on the addition of caustic soda, leaves a thick, reddish liquid, boiling at 275° C., with a specific gravity of 1113. This substance,—apiolin,—as determined by Laborde, in poisonous doses produces somnolence, stupor, paresis, and motor inco-ordination, with acceleration of respiration and pulsations of the heart, and finally death from asphyxia. In small doses its action is especially on the unstriped muscular fibre, leading to contraction of the vesical and intestinal walls, and especially of the uterine fibres; the latter is so marked in pregnant guinea-pigs as to almost invariably lead to the production of abortion. The authors group all the principles obtained from parsley, and all of which seem to have more or less activity, in the excito-motor group, since phenomena of exaggerated reflex excitability is one of the most constant results of its administration, which may reach such an extreme degree as to lead to the development of actual epileptic convulsions. They consequently attribute the action of the parsley derivatives on the muscles of the genito-urinary tract as being due to an overstimulation of the lumbar region of the spinal cord, and not directly to an action on the muscular fibre itself; while in poisonous cases the irritability extends to higher centres in the medulla oblongata, and then leads to the production of general convulsion, in the latter case not only the unstriped muscles but the voluntary muscles also being implicated.

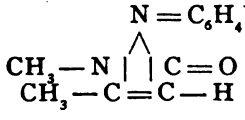
It seems, then, that there is some scientific reason for the generally-admitted value of parsley derivatives in dysmenorrhœa and amenorrhœa, and a series of cases, reported in the *Virginia Medical Monthly* for April, 1891, by Dr. Richard S. Hill (who employed the new prepration, apiolin, in capsules of 3 minims each, one being administered three times daily), seems to warrant the claims the author makes that apiolin is decidedly the most reliable drug which can be used in dysmenorrhœa. Only five cases are reported, but in these it is claimed that relief invariably resulted. It is unfortunate that as yet no reports of its use in amenorrhœa have been published, but if we are correct in assuming that we at last have a constant and reliable preparation of the active principle of parsley, we may expect improvement in such cases also.

IODANTIPYRIN AND IODANTIFEBRIN.

THE enthusiasm with which only a few years ago the search for antipyretics was prosecuted has now abated, for it was soon recognized that the morbid process in most cases was but little, or not at all, influenced by the reduction in body temperature. And yet the discovery of any new antipyretic must always attract more or less attention, for we

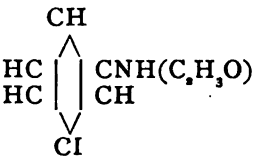
always have the hope before us in this way of discovering some specific remedy, to say nothing of the value of studies relating to the chemical constitution of such bodies and the influence of the nature of that constitution on the character of the results produced. Antipyrin and antifebrin are without doubt the two antipyretics which in the last few years have acquired the greatest reputation, while iodine as indisputably is a remedy which is one of the most valuable in our materia medica. The fact, therefore, that Dr. Ostermayer has succeeded in perfecting a chemical combination of iodine with both antipyrin and antifebrin would lead us to expect that such a compound might possess valuable therapeutic properties, and we, therefore, turn with interest to the report published in the *Prager Medicinische Wochenschrift* for January 28, 1891, and February 4, 1891, of a series of experiments made in this connection with these substances by Dr. Egmont Munzer in the clinic of Professor von Jaksch.

Iodantipyrin is antipyrin in which one hydrogen atom has been substituted by iodine; it is, therefore, iodphenyldimethylpyrazolon, $C_{11}H_{11}INO$, and its chemical constitution is in all probability the following:



It crystallizes in colorless, shining, prismatic needles; is with difficulty soluble in cold water and alcohol, more readily soluble in these menstrua when hot. It is absolutely tasteless, and has no especial odor. A two-tenths per cent. solution of this body does not prevent fermentation of grape-sugar. Its melting-point is 160° C. Dr. Munzer has studied the effects of this remedy in typhoid fever and in pulmonary tuberculosis, diseases whose temperature curves are well established. As regards the antipyretic effects of this compound, Dr. Munzer's results show that it corresponded absolutely with that of pure antipyrin, a fact which might be expected; for it is probable that through the action of the hydrochloric acid of the gastric juice this body would be decomposed, and we might, therefore, with reason look for the effects of antipyrin on the one side and iodine or iodide of sodium on the other. Dr. Munzer states that his results have shown him that in all probability such a decomposition actually does take place. He adds that, in doses of from 7½ to 22 grains, marked reduction of temperature is produced, which is accompanied by sweating, but without collapse and without chills. Pulse and respiration are slowed in proportion to the reduction of temperature, while the pulse becomes somewhat fuller and respiration somewhat freer. Eleven different cases are reported in which this substance was used as an antipyretic, the general result confirming the supposition above announced that its action is identical with that of antipyrin. The urine of every patient to whom iodantipyrin was given showed a marked iodine reaction after 15 to 22 grains of this remedy had been given, while the reaction of antipyrin in the urine with nitric acid was but faintly marked. If a perfectly clear, watery solution of iodantipyrin is tested for the iodine test with nitric acid and chloroform, a negative result is obtained, but a positive reaction is produced when either the solution or the nitric acid is heated, or when the reagents are allowed to remain in contact for half an hour. It would, therefore, seem that it is through the action of nitric or hydrochloric acid that the iodine of the iodantipyrin is set free, and the author reports some experiments which seem to show that this decomposition of iodantipyrin actually occurs in the stomach; so that, therefore, the therapeutic action of this remedy is not that of a new compound, but that which might be expected from the simultaneous administration of antipyrin and iodine, either free or in the form of a salt. It thus being seemingly established that this compound possesses no antipyretic effects other than those of antipyrin alone, the question naturally suggests itself as to whether the iodine when so administered in combination differs in its therapeutic effects from iodine administered alone. Here the author's experiments unfortunately are not sufficiently complete to admit of any conclusion. He, however, reports a case of persistent headache, apparently of syphilitic origin, which was rapidly cured by the administration of this compound, while a case of acute articular rheumatism is stated to have been entirely relieved from pain within six hours of the administration of the first dose. Further studies evidently are desirable before any positive conclusion can be formed as to the effects of the iodine in this composition.

Iodantifebrin is acetanilide in which a hydrogen atom has been substituted by iodine, the formula, therefore, being $C_6H_4INHC_2H_3O$, and its constitution in all probability the following:



Dr. Ostermayer prepared this substance from paraiodaniline, the product being with difficulty soluble in cold water, in alcohol, and ether, readily soluble in hot alcohol, and especially in hot glacial acetic acid. It has no taste and no odor, and melts at about 181½° C., and in two-tenths of one per cent. solution the substance does not prevent the fermentation of urine or of milk-sugar. The author's experiments as to the action of this substance show that, as an antipyretic, its effects were absolutely negative, and, in fact, no action was noted to follow its administration which could be attributed either to the antifebrin or to the iodine. This, of course, may be explicable as due either to non-absorption from its insolubility, or even, if it is absorbed, that the addition of iodine to its composition has destroyed the activity of the antifebrin. After its administration neither iodine nor antifebrin could be recognized in the urine, an observation which seems to show that this substance is not absorbed in the slightest degree by the alimentary canal; for tests of the iodantifebrin solution give both the iodine test and the characteristic antifebrin reactions. The author's experiments, therefore, are simply valuable as having removed two more substances from the list of new remedies from which wonders may be expected.

Reports on Therapeutic Progress.

ANGINA PECTORIS.

The meeting of the Medical Society of London, held February 9, 1891, was occupied by a discussion on the subject of "Angina Pectoris" (*British Medical Journal*, February 28, 1891). The discussion was opened by Dr. Douglas Powell, who urged that the subject should be considered on a broader basis, for angina pectoris was by no means so simple a malady as was supposed. The characteristic symptoms ranged between the wide limits of remediable functional disorder on the one hand, and fatal organic lesion of the cardio-vascular system on the other. He mentioned the case of a lady, aged 45, of neurotic temperament, who had complained of too forcible cardiac action for some years previously. There was a history of rheumatic fever fifteen years before, and five years ago, when riding hard across country, she was seized with severe cardiac pain and distress, and marked interference with respiration. These symptoms recurred on subsequent occasions. The pulse was small and cord-like, and of high tension. On using hard pressure, with one finger the pulse was felt almost, if not quite as well, as by a second finger placed further along the vessel, this phenomenon being evidently due to a back wave from the periphery. The heart's action was somewhat labored, intermitting twice in the minute; the first sound was muffled, but there was no distinct murmur. He regarded this as a case of angina of the first degree, or one of vaso-motor angina. He observed that one noticeable feature in this variety of the disease was the extreme restlessness of the patient, who often felt chilly and in need of exercise. In regard to this vaso-motor form of angina, he remarked that it was of comparatively recent discovery, and the prognosis in such cases must necessarily depend largely upon the actual condition of the heart. He regarded the vaso-motor disturbance as an essential factor in the majority of cases of angina pectoris, just as bronchial hyperæsthesia was in cases of asthma. He believed it to be possible for the heart to succumb to these attacks without itself being affected with any obvious lesion. He referred to the case of a medical man, aged 30, who consulted him on account of paroxysms of præcordial pain. On examination, there was no evidence of enlargement or disease of the heart, and he regarded it as an example of pure vaso-motor angina. A six months' rest from work left him apparently sound in all respects. He referred to another case in a gentleman, aged 68, in whom a marked improvement in the general condition occurred after an attack of gouty eczema. He remarked on the rarity of a fatal issue in these cases, the attacks if unrelieved by art usually coming to a natural end, probably through the action of the depressor nerve of the heart, and possibly some analogous mechanism of the small vessels under the stimulus of pressure inhibiting and controlling cardiac and vaso-motor spasm. He agreed with Dr. Broadbent's suggestion that some cases of fatal cramp while bathing were probably due to sudden oppression of heart from contraction of systemic arterioles; in fact, to vaso-motor an-

gina of an intense kind associated, perhaps, with a fatigued heart. Though physiologists maintained that when systemic arterioles were contracted by cold the visceral were dilated, and *vice versa*, yet it was highly probable that under certain conditions of chill and emotion the whole arterial system might undergo contraction. He quoted cases which seemed to show that the right side of the heart had borne the brunt of the anginal attack. The cardiac distress and rigid arteries of uræmia might, he said, almost be described as chronic persistent angina, though it was with the so-called cases of cardiac asthma in uræmia that the analogy with vaso-motor angina was most obvious. He then passed on to discuss angina pectoris gravior, in which the vaso-motor disturbance is associated with degenerative cardiac disease. He criticised the view that the disease was necessarily caused by or associated with disease of the coronary arteries. The prognosis in the first group was comparatively favorable, the probability being that death would ensue from some other cause, such as cerebral hemorrhage, while in the last group an almost certainly fatal result might be anticipated within a short period. Both for prognosis and treatment it was important to make out the precise condition of the heart in respect of size, position, and power. For the treatment of these two varieties, nitrite of amyl and nitro-glycerin were of great value, but far more so in the graver cardiac cases. In the first group they required to be associated with nervine tonics and sedatives, while in the second group carminatives and stimulants were of special value. He compared the pain in cases of sudden death from angina to that associated with embolic gangrene in the limbs. In conclusion, he described a syncopal variety of angina rarely met with, except in persons over 65, and then usually associated with gout. He suggested that undue acidity of the blood might be concerned in its causation. The attacks were often associated with dyspepsia, and the treatment indicated was careful feeding and gentle exercise. In conclusion, he said he regarded angina as a disturbed innervation of the heart and vessels associated with more or less intense cardiac distress and pain, and a general prostration of the forces, always producing anxiety, and often amounting to a sense of impending death. He grouped the varieties as angina pectoris vaso-motoria, angina pectoris gravior, primary cardiac angina, and syncopal angina; the first two forms bearing a remarkable resemblance to the respiratory analogue asthma.

Dr. W. M. Ord insisted on the remarkable parallel between the symptoms of asthma and angina pectoris. He pointed out that the term asthma formerly comprehended a great many varieties of difficulty of breathing, and statisticians had shown that in times past asthma was a very fatal disease, according to the returns, any reduction in this respect being probably due to better diagnosis. With regard, however, to angina, the condition was rather different; at present, people would have a larger range for angina than formerly, especially if they adopted Dr. Powell's conclusions. The old limited definition to which he alluded would certainly have to be extended to a large number of cases in which one or two only of the constituent typical symptoms of the disease, as first described, would be present. Such cases might, perhaps, be termed anginous, if not anginal. He pointed out that these anginous attacks usually came on in the daytime, and the prognosis was notably aggravated when they supervened at night. He compared the two classes of cases, one in which the patient had angina on exertion as the consequence of sudden arterial tension caused thereby, and the other in which the attack occurred independently of muscular exertion, and in these he thought the mechanism was probably nervous, either emotionally or by reflex. He had seen illustrations of both classes. He insisted on the importance of dyspepsia as a factor in bringing about the attacks, and observed that if he were restricted to one remedy in the treatment of angina he would prefer sulphate of magnesia to nitro-glycerin, in order to secure a regular action of the bowels. He mentioned the frequent coincidence of glycosuria with angina, which he thought authorized the inference that the visceral blood-vessels were dilated, and not contracted, as the author seemed to suppose, along with the superficial vessels. He said that the connection of gout with angina ought not to be forgotten, it being a neurosis, and involving, as it did, changes in the chemical constitution of the tissues. Treatment directed to the gout often relieved the angina. He insisted upon the fact that no sensations of an anginous type were to be treated lightly, and the patient or his friends ought always to be warned of the danger.

Dr. W. H. Broadbent said he had been unable to make up his mind as to the condition of the heart during the paroxysm

Sometimes the pulse was irregular and small; sometimes there was high arterial tension, at other times not; while occasionally the pulse was practically unaffected throughout an attack even of great violence. The central fact, after all, in attacks of angina, was that the heart was overwrought, either by peripheral resistance or on account of intrinsic failure. That fact fitted in very well with the author's classification. It was especially in those cases due to weakness of the heart that the great danger lay. He pointed out that vaso-motor resistance alone would not be sufficient to determine an attack. The proportion of cases of high arterial tension without angina pectoris was very much greater than the proportion of fatal cases of angina in which there was no disease of the coronary arteries. He presumed that disease of the coronary arteries acted by causing degeneration of the cardiac muscular fibres. In bed and during sleep there was the upward pressure of the abdominal viscera and the curious running down of the cardiac powers to account for the supervention of the attacks. He pointed out that muscular exertion lowered very rapidly the resistance of the peripheral circulation. The effects of exercise were exerted principally on the right side of the heart. With reference to the neurotic theory, he pointed out that the vast majority of anginal cases occurred in the non-neurotic sex, being extremely rare in women. They ought, therefore, to beware of attaching too much importance to an unexplained neurosis. The occurrence of angina in gouty people he ascribed to its association with high arterial tension. He had also noted the existence of a myocarditis in patients suffering from glycosuria, associated with high arterial tension, and this was usually followed by marked anginal paroxysms. He remarked on the fact that angina was seldom or never associated with mitral lesions, and anginal symptoms usually subsided on the supervention of a mitral lesion in a person subject to anginal attacks. His own experience seemed to show that the gravest cases of angina were those in which the least explanation could be found to account for the symptoms.

At the meeting of the London Medical Society, held February 23, SIR WALTER FOSTER, of Birmingham, reopened the discussion on "Angina Pectoris" (*Lancet*, February 28, 1891). He agreed with Dr. Powell that a broad basis should be taken for consideration of this subject, for under this title could be grouped a series of conditions, from trivial remediable disorder to severe attacks of terrible heart-pangs, ending in sudden death, and, if they were considered as a whole, some ideas might be built up as to their pathology and treatment. He first desired to refer briefly to four cases. The first was that of a doctor, aged 64, who complained of angina pectoris, which came on in the course of the night. The symptoms were described as those of intense pain, which developed in the region of the nipples and radiated down the left arm, and he was seized with terror and a sense of impending dissolution. Under sinapisms and free stimulation he was relieved. It was in this patient the beginning of a gouty condition, and attacks were afterwards induced by walking up-hill. The patient died of a dilated heart eight years afterwards. He saw another case in the year 1863, when he was in charge of a friend's practice in the south of London. It was that of a young man who was a good runner, and who one evening ran the length of the street for a wager. When near the end of the street he uttered a sudden cry and died in a few minutes. A careful necropsy revealed the left cavities empty, the right ventricle almost so, while the right auricle was enormously distended. In his death-agony he complained of intense cutting pain in the chest. In another case, a prematurely old man, aged about 56, complained of intense pain across the chest; the pulse was slow, not more than 50 to the minute, and was of high tension. During the attacks the pulse fell to 36, and became intermittent; there was pain between the nipples, down one or both arms, together with much anxiety, general clammy sweats, and pallor of the face. Against advice he married a young wife, and though he survived very well the earlier weeks of matrimony, he died eleven months later, and at the necropsy no valve lesion was found, and there was no aortic atheroma. In another case, which occurred in a medical man, he graphically described the attack. The pulse fell to 20 at the wrist, though the heart was beating more frequently, and it was small, irregular, and hard; the face was pale, there was no pain in the chest, but he felt that he was dying. Sinapisms were applied to the chest and hot bottles to the feet, while strophanthus, with ether and ammonia, were given internally. Under this treatment he recovered; he put it down to a neurotic attack induced by influenza, and influencing the pneumogastric nerve. Later he had a second attack, slighter in degree, but

he died in the midst of a third, which came on at night, and was associated with well-marked heart-pang. No necropsy was made, but there was no indication during life of organic disease of the heart or arteries. These cases illustrated certain features of the affection, and he wanted to compare them with other cases,—cases in which there was agonizing pain accompanied by grave organic disease. In one man, who committed suicide on account of the anguish, there was double aortic valve mischief, with an aneurism springing from one of the sinuses of Valsalva, and pressing on the root of the aorta and on the cardiac nerves. In the cases of valve disease which suffered the most pain there was considerable dilatation of the left ventricle of the heart, with, later, degeneration of the cardiac muscle. As this dilatation was usually associated with aortic disease, it confirmed Dr. Walshe's remark that the cases of disease of the basal valves were those associated with angina. He had once witnessed a case of rapidly-developing insufficiency of the aortic valves produced by a sudden strain. The patient had severe chest pang, and was collapsed and insensible. He was bled from the arm and rallied, and was then found to have aortic regurgitation, although he was known before the strain to have sound valves. For days he complained of stretching pain under the sternum, due to dilatation of the ventricle. The same kind of stretching pain was met with when further dilatation was in progress in an already diseased heart, as when the hypertrophied muscle underwent degeneration late in Bright's disease; and such cases were relieved by the establishment of mitral regurgitation. In all these cases he had related he believed the immediate cause of the heart-pang to be distention of the cavities of the heart, either right or left. In the case of the patient who got his attacks when walking up-hill, the right was involved, while in the gouty patient, in whom the attack came on at night, it was the left ventricle which could not overcome an increased vascular pressure, brought about, perhaps, by the circulation in the blood of some excess of uric acid. He held that stretching and not spasm was meant by the "distentio" of Heberden. He thought that in all or nearly all the cases there was a degeneration of the myocardium, with distention of the cardiac cavities. This view was counter to that of neurosis, but he knew of no direct evidence to support the idea of spasm of the coronary arteries. In Sir Richard Quain's revised article on "Angina" he referred to Dr. McWilliams's recent researches as to the nature of "delirium cordis" in animals in which there was a quick irregular cardiac action, with fall of blood-pressure due to a distended ventricle remaining in a state of diastole and excited by trivial causes, such as distention of the gut. He preferred to regard angina not as a disease, but as a mode of death and a term under which might be grouped a number of allied conditions having a common pathological basis. In the treatment a scientific step had been made when drugs like nitrite of amyl and nitro-glycerin were introduced, which counteracted the vascular condition which was the starting-point of the malady. If the pain were prolonged, morphine subcutaneously was indicated, while in the intervals no drug was more valuable than arsenic, with ether, iron, bromides, or alone. Iodide of potassium, in doses of 5, 10, or 15 grains three times a day, had wonderful power of lessening the pain and improving the patient's condition. The female sex were not troubled with angina because they were less exposed to strain of the heart than men.

Professor Grainger Stewart, of Edinburgh, found that his line of thought diverged considerably from that of the previous speaker, and he referred to the interesting comparisons that had been made between glycosuria and asthma and the affection under discussion. Cases of angina grouped themselves into four categories: 1. Simple neuralgia of the heart, seen in women at the climacteric, and in men of gouty constitution, in which pain was referred to the heart itself, and was very amenable to treatment. 2. A condition of angina dependent upon and associated with acute or subacute inflammation of the aorta. He had more than once seen a patient describe a curve on his chest, like that of the aorta, to indicate the site of his pain, and he described a case in which pain was referred to the lower part of the thoracic aorta which recurred in paroxysms and travelled gradually higher up. Later a marked double aortic murmur developed, and death occurred. There was no post-mortem, but aneurism, pleurisy, and new growth had been excluded, and he considered that the case had been one in which an aortitis had commenced low down and had spread upward, damaging the valves and producing dilatation of the heart. Though this latter had only developed at the last, pain had been present from the first, and had been of true anginous character. 3. A common group of cases in which angina pectoris was associa-

with fatty, fibrous, or other degeneration of the cardiac walls, or with changes in the coronary arteries. 4. Angina pectoris associated with spasm of the arteries and increased tension. There was very little change in the heart, but it was overmastered by the arterial spasm without the coronaries or substance of the heart being necessarily involved. As to the determining causes of anginal attacks, many of them would apply to all four groups. They were exertion, emotional excitement, such as anger or grief, dyspepsia, constipation, the various toxines absorbed into the system from the intestines, or from failure of the kidneys or other eliminants, and certain changes in the nervous system, such as, for instance, occurred when sleep was setting in; each or all might suffice to bring on an attack. But in any of the last three pathological groups the same lesions might exist without pain; so that one had to ask one's self what was the explanation of the pain when it occurred. Was it of muscular or of nervous origin? Sir Walter Foster had said that it was a muscular pain, but he did not know what spasm of the heart-muscle meant; he doubted very much if it were like cramp, though a vague idea to that effect still floated in the minds of some. What seemed against this was that the heart and pulse might remain steady all through an attack, and if aortitis could of itself be a cause of angina, that vessel did not contain enough muscle to produce a painful cramp. He therefore looked upon it as a pain of nervous rather than of muscular origin. Inquiring whether any purely nervous diseases resembled angina, he pointed out that epileptiform neuralgia was wonderfully like it, coming on in sudden paroxysms, and often ceasing as suddenly, leaving the patient well, but subject to a new attack, being more common in men, and at or after the middle period of life. Certain slight peripheral influences would provoke intense pain, which was relieved by cutting or stretching the affected nerve. So also in angina, explosions of pain occurred from time to time in connection with irritation in the aorta or heart, the cardiac nerves being capable of afferent as well as efferent function. In short, he suggested the essence of the process to be a change of organic or functional nature in the nerves or nerve-endings which controlled the heart, and he added that distention of the heart did not necessarily produce pain. For treatment, he agreed that the general health should be improved, excitement and effort being avoided, and nitrite of amyl administered to relieve spasm. The latter drug he believed had also a direct effect on nervous structures, for it relieved other neuralgiæ. Arsenic and iodide of potassium were invaluable, and occasionally direct cardiac tonics, such as digitalis and strophanthus, might be given with benefit.

Professor MacVail, of Glasgow, agreed that the basis of the whole subject should be broadened, so that any condition of pain about the heart should be alluded to as angina. As regarded the pain, it might be general or partial. He had seen two cases in which it was likened to a knife plunged into the apex of the heart; in another it was as if needles had been driven in; in another as if crushed or grasped; and in yet another as if greatly dilated, the patient actually feeling to ascertain if his chest was not bulged out. In some the pain was radiating, in others it was distinctly local. The question of radiation depended on two circumstances,—on the amount of the pain and on the ability of the nerves to conduct. People differed from one another, and the same people differed at different times with regard to their power of conductivity. In one of the cases above mentioned, in which the pain was knife-like, there was no radiation; but in the second case of knife-like pain it passed from the cardiac apex to the left shoulder. In the case in which the pain was like needles it passed from the apex of the heart to the scapular angle, thence to the top of the left shoulder and down to the bend of the arm. In the case in which the heart felt to be dilating, the patient either became faint or was confused mentally; this might be due either to an insufficient blood-supply to the brain, or it might be really an instance of radiation, and thus resemble some of the mild forms of epilepsy. Not only did pain radiate from the cardiac seat, but before the attack began a sensation might also travel towards the cardiac area. It was a kind of aura. In one case, that with the crushing sensation, the patient described a sensation of burning or of boiling water poured on a small area of skin near the umbilicus; thence it travelled towards the heart, and then the attack of angina commenced. In the case where the pain was like needles, it commenced at the inner end of the left seventh interspace; thence it travelled to the apex of the heart, which took five minutes; from there the pain went to an inch below the scapular angle, taking ten minutes, and it was now no longer like needles, but like a knife; thence to the left

shoulder in five minutes, and finally to the bend of the arm in two minutes. The connection between angina and epilepsy was worth more attention than had been paid to it, and in every case an antecedent sensory condition should be inquired for. He had found the organic conditions present to vary much; in one of the cases of knife-like pain there was a double mitral murmur, while in the other there was mitral regurgitation alone. In the instance where the sensation was of a crushing character there was a double mitral murmur; in that in which a sense of dilatation was complained of, the condition was one of double aortic trouble. In the case where the pain was like needles, no organic abnormity could be made out. What was the actual condition of the heart when the pain was present? Sir Walter Foster and Professor Stewart had contended that it was not cramp. Was it possible to separate cramp from a neurotic condition? Though it might be done in laboratory work, it was quite impossible to separate them in practice. He himself was quite unable to separate the nerve condition from the muscular condition of the heart as regarded pain. An ordinary muscular contraction was a pleasurable sensation, as in exercise; but if the contraction were much increased in intensity, as under strong faradism, it then became painful, and was a condition of cramp. The muscular condition in the living body was always one of tonus; there was no such thing as complete relaxation during life. It had long been taught that the cardiac contraction was not one of physiological tetanus, but this idea had been proved beyond all dispute to be false. If over-contraction were present, it was simply a question of degree whether pain would be present or not. Dr. Walshe had objected to angina being due to spasm, because he held that, if it were due to spasm, the heart would necessarily remain continuously contracted during the spasm. But this by no means followed, for if the upper extremities were thrown into a condition of tetanus by means of the faradic current, it would be still found possible to move the hands, unless, indeed, the current were extremely strong; so in moderate cases of angina the tetanic spasm was not strong enough to interfere with the impulse. Dr. Walshe likewise stated that as in diastole the ventricle was flaccid, the angina, if due to spasm, should be intermittent. But there was no evidence to show that the ventricular wall ever became flaccid even in diastole. The presence of a murmur in aortic regurgitation was fatal to the idea of the ventricle ever giving up its grip of the blood. The idea of this murmur being caused by valve vibration was of course absurd, and Balfour had shown that it was caused by a thin stream of regurgitant blood forcing its way back into a mass of blood remaining in the ventricle under considerable tension. If the ventricle were thus never quite flaccid even in diastole, it removed the great objection to the theory of spasm. He thus upheld the old idea of Heberden, as supported by Latham, that the condition of angina was immediately dependent upon spasm of the heart. The excessive irritability of nerve and muscle caused by overwork induced instability of the nerve-centres, and if the explosions from the unstable centres became sufficiently frequent, then a condition of cramp would result. He asked, in conclusion, that each individual case should be examined in reference to the order in which the parts were attacked by pain and the directions into which it radiated.

The meeting of the Medical Society of London, held March 9, 1891, was also devoted to the continuation of the discussion on "Angina Pectoris."

At this meeting, DR. LAUDER BRUNTON, in reopening the discussion, observed (*British Medical Journal*, March 14, 1891) that in discussing the subject much help might be obtained from the analogy pointed out by Professor Grainger Stewart between the heart and the bladder. Both were hollow muscular organs, contracting and dilating at fairly regular intervals, and expelling liquid contents. In both slight distention formed a stimulus to contraction; but, if the distention became excessive, it might cause pain, varying in amount from slight discomfort to extreme agony. The sensation of pain, he said, was always central, for it depended on a condition of the brain which might be excited by a peripheral irritation like a diseased joint, but might exist quite apart from any peripheral disease, as in hysteria. A mixed condition might exist which was both central and peripheral, as in the vesical arises of locomotor ataxy, and possibly a similar condition might occur in the heart. Usually distention, either of the bladder or the heart, not only caused contraction in them, but, through the nervous system, lessened the resistance of the sphincter in the case of the bladder, or of the arterioles in the case of the heart. Disturbance of this nervous relationship might cause excessive distent-

or pain in either organ apart from organic disease, giving rise to spasmodic retention of vaso-motor angina. But while the spasmodic character of angina pectoris indicated its nervous origin, it was so frequently associated with diseased coronary arteries and fatty heart, that these evidently played a great part in its causation. Angina pectoris might be said to be due neither to high tension alone, nor to weak heart alone, but to weakness of the heart in relation to the resistance it had to overcome; and it might be brought on either by weakening the heart or increasing the resistance, or both together. In tracing out its pathology, the analogy with the bladder was useful. The resistance which the heart had to overcome depended upon the contraction of the systemic arterioles. Of these there were three subdivisions,—cutaneous, visceral, and muscular,—and the latter was the most important in relation to the attacks of angina. One of the most striking symptoms of angina was the ease with which it was brought on by muscular action. The first effect of this was to prevent the passage of blood through the muscles and to raise the tension, although afterwards the vessels of the muscles dilated and the tension fell. To this primary rise Dr. Brunton attributed the occurrence of anginal attacks on exertion; and their passage off, if exertion could be continued, was, he considered, due to the subsequent dilatation of the vessels of the muscles, with consequent fall of blood-pressure and lessened resistance. He thought that atheroma of the coronary arteries was so powerful in causing angina because it prevented the supply of blood to the heart being increased on exertion, as it ought to be in muscles generally. The pain of angina he considered to be due to distention of the heart, and its more common occurrence in the left than the right side of the heart to be due to the greater ease with which the tricuspid valves became incompetent than the mitral when the ventricles became dilated. Angina pectoris was very rare in children, but one case was recorded of a boy, aged 14, in which there was aortic regurgitation and mitral stenosis; and another in a boy, aged 11, where there was ossification of the auriculo-ventricular groove, conditions which would prevent dilatation of the mitral orifice and insufficiency of the valves. He agreed with the previous speakers in regard to the necessity for the elimination of waste products, and also for restricted diet in gout, and for the use of iron and arsenic in feeble heart; but he regarded the nitrites as the most efficient remedy during a paroxysm, and, on the whole, iodide of potassium as the most useful in the interval. He showed a tracing which appeared to indicate that it lessened the rise of blood-pressure in exertion, and mentioned a case illustrative of its remedial action.

Dr. J. Mitchell Bruce said he should confine his remarks to a few practical points, the first being what was called vaso-motor angina. He had seen a great many cases answering to the description that had been given of this vaso-motor angina, but he did not think that they were really cases of this kind; indeed, he was of opinion that such cases were very rare, and the term as generally employed was not only unfortunate but misleading. He pointed out that in most instances the malady occurred in elderly people, between 40 and 50, inclined to be stout, and who had led an anxious but not overactive life,—men who had achieved an independence and felt entitled to enjoy themselves a little. They sooner or later had symptoms of irregular gout, and he insisted upon the fact that such patients were unlikely to present a hard pulse, for they were generally weak and nervous. Moreover, there was very frequently a history of cardiac strain, and the first attack of angina was often referred to a particular instance of overexertion. When men with this gouty disposition strained their heart there was a tendency for the gout to attack the heart, just as it tended to attack other parts of the body that had been subjected to strain. If an attack of acute gout supervened, it might be associated with a rise in the blood-pressure, but its effect was not to make the patient worse, but to relieve him. They were thus confronted with the observed fact that an attack of angina was relieved by a condition which might be expected *a priori* to aggravate it or to bring it about. He maintained, therefore, that high tension was not a usual factor in the production of angina pectoris. In the matter of treatment, he recommended muscular exercise, attention to diet, iodide of potassium, and the use of purgatives. He suggested that the use of the term "vaso-motor angina pectoris" should be abandoned in favor of some such description as "gouty heart," which described a pathological condition, and not a mere collection of symptoms. With regard to the classical angina, he had been struck by the large proportion of minor cases as compared to the severe ones. He remarked incidentally upon the involuntary passage of a copious

motion at the onset of a severe attack, and he concluded by expressing surprise that nothing should have been said in reference to the so-called pseudo-angina.

DR. F. DE HAVILLAND HALL observed that gout of the heart was a not uncommon cause of death. The condition described as "gout of the stomach" was often due to angina, the cause in other cases being gall-stone colic. He mentioned that angina pectoris and gall-stone colic were often confounded, relating a case in support of this view in his own practice. He alluded to the effect of cold in precipitating the attack of angina in certain patients, and mentioned that these were precisely the cases in which nitroglycerin did the most good.

DR. SEYMOUR TAYLOR said he had made a special study of heart spasm, and divided cases of angina into cardio-vascular, neurotic, and reflex. He called attention to the fact that angina was mostly met with in patients belonging to the better classes.

DR. FLETCHER LITTLE related three cases illustrating various clinical features of the malady.

DR. J. ROSS (Manchester), who was not able to be present, had written a letter to suggest a theory to account for the distribution of pain in angina. His idea was that the local pain was conducted to the portion of the spinal cord corresponding to that from which the diseased viscus derived its splanchnic nerves, and then spread through the posterior horns of the gray matter, and led to eccentric projections referred to the terminations of the somatic nerves derived from the same segment of the cord.

PROFESSOR GAIRDNER, of Glasgow, also wrote, expressing his inability to recognize the angina pectoris vaso-motoria of Nothnagel as a true clinical description, and he thought that the term was positively misleading. He admitted that there might be a vaso-motor element in Heberden's angina, but urged that this was distinctly subordinated to organic structural changes in the heart.

The PRESIDENT, in reply, said he was unable to divest himself of the view that the cause of the pain was spasm of the heart resulting in distention, and he could not rally to the idea of its being due to neuralgia. He pointed out that neurotic affections were invariably associated with disturbance of function, and yet it was a matter of observation that in certain cases of angina the action of the heart was not interfered with even during the attacks. This militated strongly against the neuralgic theory. He dissented from the view that angina was not usually associated with lesions of the mitral orifice, and observed that this was at any rate not his own experience. Moreover, it was generally at the mitral orifice that evidence of degenerative changes were first met with in elderly and gouty people. With reference to the relative value of nitrite of amyl and nitroglycerin, he usually gave preference to the former. He mentioned a case in which the dose had been carried to 7 minims three times a day, rising to 35 drops during an attack, the dose being repeated after a short interval. Special attention had been paid to insure the solution being of the proper strength. He observed, however, that such doses could only be safely resorted to with the patient under close observation, and very gradually. With regard to the exercise treatment, he said he would be very sorry to advise it in what he still regarded as a definite class of cases,—namely, the vaso-motor anginas. In these cases muscular exercise would be likely to prove injurious. He concluded with an expression of gratitude to those gentlemen who had joined in the discussion, regretting that time did not permit of a fuller reply to their very interesting remarks.

SOME COMPLICATIONS OF CHLOROSIS.

The manifestations of chlorosis may occur in the most varied forms, and in certain complications they are a source of great danger, seriously interfere with a favorable prognosis, and cause difficulty in the diagnosis. Two of these especially deserve attention,—thrombosis and fever. These two complications have been made the subject of an essay in the *Revue de Thérapeutique Medico-Chirurgicale* for February 1, 1891, by DR. SICARD, who calls attention to the fact that thrombosis in the course of chlorosis nearly always occurs in the form of phlegmatia alba dolens, which is a rare complication, it must be admitted, though numerous cases have been reported in the last few years.

Trousseau, many years ago, was the first to recognize its existence, and stated that undoubtedly the reports of the frequency of the complication would be much greater if attention was directed to the possibility of its occurrence. Thrombosis may occur in any period of chlorosis, but it especially occurs when the disease is severe and undergoing rapid progress, although it may also occur in cases of moderate severity, and ordinarily makes its appearance

at the commencement of the affection, when the cachetic condition has not yet been developed. This complication may appear spontaneously, but fatigue should be considered as a predisposing cause. The lower extremities, and especially the left leg, is ordinarily the seat of a venous thrombosis. It has, however, been recognized as occurring in the vessels of the upper extremities, and sometimes even in the cephalic blood-vessels, but in the latter condition the thrombosis may even occur in the arteries, especially the artery of Sylvius, or sometimes in the venous sinuses. Perhaps in this latter case the immediate causes of thrombosis have not always been eliminated, such as severe affections of the middle ear or infectious tonsillitis.

A case reported by Charmeil proves the reality of thrombosis of the sinus due to chlorosis. The case was that of a young woman, 24 years of age, free from any syphilitic, tubercular, or rheumatic affection, in whom severe cerebral symptoms developed after exposure to the sun. There was violent headache, insomnia, disturbance in the co-ordination of the pupils, delirium, and death resulting in coma. The autopsy demonstrated cerebral softening, due to a thrombosis of the superior longitudinal sinus. Vergely, also, has related two cases of arterial thrombosis occurring in chlorotic cases in whom at the autopsy the left Sylvian artery was found obliterated by a clot. In addition to the state of the blood, which predisposes to coagulation, the condition of the circulation in the Sylvian artery favors the production of this accident.

Finally, Rendu has reported an observation of spontaneous thrombosis occurring in the pulmonary artery during the course of chlorosis. With the exception of these very rare cases, thrombosis in chlorotic patients nearly always occurs in the veins of the lower extremities, usually on the left side, and so is a true phlegmatia alba dolens, whose anatomical location may be attributed to the readiness with which circulation in the left iliac vein may be compressed by distention of the sigmoid flexure. Consequently, it occurs usually in patients subject to constipation.

The phlegmatia of chlorotic patients usually appears suddenly, pain of moderate intensity occurs in the calf of the leg, and radiates through the leg, either downward or towards the thigh. At the outset, walking is not interfered with, and the accustomed occupation is not necessarily stopped; however, by the end of two or three days, the intensity of the pain becomes such that the patients are forced to remain in bed. It may be noted that the œdema is the first symptom to call attention to the disease, and this may occur either in the upper part of the thigh or in the calf; but it is always very rapid, more so than in the phlegmatia of other causes.

The beginning of thrombosis is also indicated by fever, which, in some cases, precedes by one or two days the appearance of the complication or even the first signs of pain. The temperature, more elevated in the evening than in the morning, may pass 104° F., but the thermic curve possesses no special characteristics. The febrile excess is proportionate to the extent of the local lesion and the degree of lymphangitis, or to the presence of other complications, which should be always looked for. The aspect of the limb is similar to that observed in cases of phlegmatia: there is white œdema, with extensive infiltration of the part, while red and painful streaks denote the inflammation of the cutaneous lymphatics. Palpation causes acute pain over the course of the affected veins, and should the pain not be very severe, the veins may be recognized under the fingers in the form of solid cords. Exploration, however, should be performed with the greatest care, and should not be prolonged, as it is by no means free from danger.

Phlegmatia occurring during the course of chlorosis is usually of slow progress, its duration varying from twenty days to two months. Of course an embolus may be detached and carried to different parts of the system. The symptoms due to pulmonary emboli vary with the size of the clot, though cases are on record in which sudden death occurred from suffocation. This possibility should always be borne in mind by the physician, but with this reservation, it may be stated, that the prognosis in chlorotic thrombosis is usually a favorable one. The diagnosis of the condition itself is not difficult, but it is a point in which careful attention should be directed, for the cause should not be attributed to chlorosis but by exclusion, consequently careful examination should be made as to whether there exists any cachexia, any general dyscrasia, or any infectious disease. In the female puerperal complications should be looked for, or a possible lesion of the genital organs. As to the mode of production of thrombosis, two conditions may be concerned, the one relating to the state of the blood, the other to the walls of the blood-vessels. The alterations of the blood are by no means doubtful in the course of chlorosis, and the experiments of Hayem on intravascular injections seem to establish that an-

æmia facilitates the production of concretions. It may be that the blood by its alterations contains in itself the cause of the coagulation. It is interesting to determine what leads to the production of the thrombosis at any one point rather than at another. This is to be explained as due to the induction of vascular lesions. The extreme anæmia may lead to fatty degeneration of the internal walls of the blood-vessels, but this lesion can hardly explain the production of thrombosis at the onset of chlorosis, or where the disease has not made very marked advances. Rendu attributed to micro-organisms the principal *rôle* in the phenomena of coagulation in thrombosis, for the chlorosis, according to him, acting as a debilitating disease, depresses the organism, and so favors the invasion of germs. It must be admitted, however, that the genesis of chlorotic phlegmatia is far more from being clearly elucidated. The treatment of the complication does not differ from that which would be applied under other circumstances. It consists principally in the most complete repose, the patient being warned against moving, lest the motion might lead to the detachment of a part of the clot. Constipation should be combated with enemata, for the accumulation of fæces in the sigmoid flexure by disturbing circulation interferes with resolution. The pain may be combated by application of the extract of belladonna, while if the fever is at all marked, recourse should be had to quinine.

The second complication, which is not rare in chlorosis, is fever, to which Dr. Molière was the first to call attention. This author has shown that in nearly all cases in chlorotics the mean temperature of the body is above the normal, and is usually about 100½° F. The type of the fever in chlorosis is not, however, always the same. In most cases the temperature-curve is characterized by very slight oscillations, which do not extend over 1°, and the fever is, therefore, a slight continued fever. In rare cases, the fever may develop exacerbations, in which the temperature will rise to 104°, and Dr. Potain has reported the case of a young chlorotic girl with a constant temperature of 103°. In spite of the uneasiness which this state might occasion, the fever disappeared completely when cure of the chlorosis was produced. Fever does not occur in chlorosis until the anæmia has reached a very advanced stage; but, of course, before attributing the fever to chlorosis, careful examination must be made to eliminate all other possible causes, such as gastric disturbance, angina, or other disturbances which might cause the attack. Sometimes, also, it should be recollected that the fever occurs under the influence of fatigue or prolonged exercise. According to Dr. Hayem, fever does not occur in chlorosis until the globular richness of the blood expressed in healthy corpuscles is below one and one-half millions, although sometimes there is no proportion between the fever temperature and the anæmia; but it has been demonstrated that complication is, in the majority of cases, closely associated with the chlorosis, for in those cases where its appearance has been noted and other causes excluded, it disappeared under remedies which cured the chlorosis. It is difficult to explain the production of fever, which is to be regarded as a sign of exaggerated oxidation in chlorotic individuals, where all the nutritive operations are depressed far below normal. The most reasonable explanation is to attribute it to some heat-regulating mechanisms of the body by which the balance between heat production and heat dissipation is interfered with. Of course vaso motor phenomena are likewise maintained, and there may be chilling of certain peripheral processes, and increased temperature of others, while urea always is increased during the causation of fever.

The principal interest in the study of fever in chlorotic cases is found in the difficulty which it adds to the formation of a diagnosis. The first point to establish when one meets with the presence of fever in a chlorotic individual is to endeavor to determine the cause of the fever. A careful examination should, therefore, be made of all organs, looking for a possible cause of infection. The urine should be examined, and if the amount of urea is that which is usually found in chlorosis, one would be authorized to believe in the existence of the febrile form of the disease. Especially should care be exerted in looking for a possible latent tuberculosis. Emaciation is one of the earliest signs of this, and every young pale girl, who at the same time loses weight, should be placed under careful observation and watched with the greatest solicitude. Cough and the phenomena developed by auscultation are of less value, for the cough exists in chlorotics, and the stethoscopic signs are often very obscure in many cases of tuberculosis. In tuberculosis, however, a temperature is ordinarily met with which is unknown in chlorosis, and if the temperature is above 104° or 105½°, if the pulse is maintained at 120 to 130, the situation should be regarded as grave and a rapid tubercular affection suspected. Of course these remarks only apply to cases in which signs of auscultation or the detection of the bacilli

have not made the diagnosis positive. The fever occurring in chlorotic patients does not call for any special indication as regards treatment. It is combated by the treatment intended to combat the anæmia,—that is to say, by well-selected iron preparations and suitable regimen. Dr. Hayem has, however, called attention to the advantage derived from the use of cold applications, and in all cases of intense chlorosis where there is a tendency to syncope or the patients are easily exhausted, the wrapping in wet sheets is of the greatest efficaciousness. A revulsive effect is obtained, and at the same time a stimulating and a nervous action. Once or twice daily the patient should be wrapped in a wet sheet, and the application continued for two or three minutes. In all cases, however, the fever is not to be regarded as constituting any special source of danger. It deserves, however, attention mainly from the fact that its occurrence is always associated with chlorosis of very intense form.

ULCERATIVE ENDOCARDITIS.

At the meeting of the Metropolitan Counties Branch of the British Medical Association, held February 4, 1891, Dr. Frederick Taylor read a paper on "Ulcerative Endocarditis," in which he defined the disease as a febrile process, resulting from recent, often ulcerative, lesions of the endocardium, accompanied, as a rule, by evidences of embolic obstruction in different parts of the body (*British Medical Journal*, March 7, 1891). He recorded a case, recently under his care and that of his colleagues at Guy's Hospital, in which the characteristic features of persistent pyrexia, cardiac valvular disease, anæmia, optic neuritis, and enlarged spleen were seen clinically; while, after death, there was found to be an extensive lesion of the mitral valve, with rupture of the chordæ tendineæ, and abundant fungating granulations on the surface of the left auricle. Micro-organisms had been found in the vegetations by Dr. Pitt. With regard to the etiology of the disease, observations were more and more tending to confirm the views of those who believed that ulcerative or septic endocarditis was not due to one particular organism, but might result from the invasion of the organisms of different diseases. According to MM. Lion and Martineau, there had been found in cases of septic endocarditis the organisms of septicæmia and pyæmia, those of pneumonia, typhoid fever, and tuberculosis, as well as six others not found in other diseases. In different cases the valves might be differently affected according to the particular organisms concerned. Clinically, it became of the greatest interest to note the diseases with which any case of ulcerative endocarditis was associated as bearing upon its course and complications. Thus it had been noted by more than one observer that septic endocarditis following pneumonia attacked especially the aortic valves, and was sometimes accompanied by suppurative meningitis. Such a case had happened at Guy's Hospital comparatively recently. Dealing with the symptoms, Dr. Taylor called attention to the cardiac murmurs, the pyrexia, and the evidences of embolic processes, and discussed points connected with them. He pointed out the long duration of the pyrexia which was seen in some cases, extending, for instance, to six months in the case above quoted, during which the fever was almost absolutely regular, the temperature rising at night and falling in the morning. The evidences of obstruction he dealt with under six heads,—(*a*) absence of pulsation in accessible vessels; (*b*) loss of function of vessels not accessible,—for example, hemiplegia from blocking of a middle cerebral; (*c*) disturbed function, such as albuminuria; (*d*) obvious infarcts, as shown by the enlargement of the spleen in some cases; (*e*) hemorrhages,—of some of these he suggested that they might not be embolic, but rather stand to the bacterial virus of endocarditis in the same relation as the petechiæ of small-pox and typhus did to the virus of those diseases,—namely, they might be toxic in origin; (*f*) inflammatory lesions, such as optic neuritis and nephritis; their relation to embolic processes was uncertain. Among the various symptoms of this disease, special stress was laid upon anæmia and optic neuritis. Anæmia was very frequent, and had some diagnostic value. Optic neuritis occurred with greater frequency in this disease than in typhoid fever, with which it was apt to be confounded.

NEPHRITIS IN CONSUMPTION.

In the *Centralblatt für Allgemeine Pathologie*, No. 3, 1891, Dr. C. V. Kahlden, of Freiburg, describes certain changes which he has observed in the kidneys of phthisical patients, apart from those brought about by actual tuberculous disease or amyloid degeneration. The whole organ is either not all or only very slightly enlarged; the capsule is easily separated from the yellowish-white surface; the cortex is but little narrowed,

but invariably shows a slight yellowish discoloration; the medullary tissue is usually pale and anæmic. A case of chronic phthisis is related, and full details given of the microscopic appearances corresponding to the yellow changes in the cortex. The clinical evidence of these changes is very limited. Albuminuria may be altogether absent, or only present at irregular intervals in minute quantity. There is, as a rule, no hypertrophy of the heart and very little œdema of the extremities. The actual changes within the kidney consist for the most part of an irregular aggregation of small round cells within the capsule of the glomeruli, the cells themselves showing minute fatty changes. The endothelial cells lining the tubules show a certain amount of fatty change, and small granular cells are scattered in the intertubular tissue also; but the distinctive difference claimed for this form of degeneration over others that are recognized as occurring in chronic phthisis is the occasional limitation of the degenerative process to the endothelium of the tubules, the interstitial tissue being but little altered. The changes are looked upon as essentially degenerative in nature and as prone to affect the parenchyma of the organ in the first instance. The author discusses the arguments for and against this view at considerable length, and concludes that such parenchymatous changes in the kidney in cases of long-standing chronic phthisis are the rule rather than the exception.—*British Medical Journal*, March 7, 1891.

THE SYMPTOMS OF MYXŒDEMA AND EXOPHTHALMIC GOITRE.

At the meeting of the Edinburgh Medico-Chirurgical Society, held March 3, 1891, DR. BRAMWELL read a paper, in which he contrasted the symptoms of myxœdema and exophthalmic goitre (*Medical Press and Circular*, March 11, 1891). In both of these affections the thyroid gland was affected. In the former it was atrophied and its functions diminished, while in the latter it became hypertrophied and its functions increased. In myxœdema the symptoms came on in a slow and insidious way, generally late in life, and usually in married women; in exophthalmos they often set in suddenly, as after a fright, earlier in life, and in unmarried, or, if married, sterile women. The temperature in myxœdema was subnormal, and patients felt cold, the skin was dry and harsh, and its electrical resistance increased; in exophthalmos the temperature was subject to elevations, the skin soft and moist, and its electrical resistance diminished. Constipation and amenorrhœa were usually present in the former affection, while in the latter diarrhœa and menorrhagia were frequently met with. Nervousness was not present in myxœdema, but was a constant symptom in exophthalmos. Myxœdema was said to be the result of degeneration of the thyroid gland, and might be secondary to some nerve lesion. In cases where the thyroid became atrophied or its functions diminished, or where it had been extirpated, these symptoms of myxœdema appeared. The symptoms of exophthalmos, on the other hand, were the result of excessive activity of the function of the thyroid, or might be due to perverted function of the gland. The pathology of exophthalmos was obscure, but the primary cause was apparently nervous, and due to some derangement of nerve-centres.

BACTERIA IN THE SALIVA IN CASES OF MEASLES.

DRS. H. MERY and P. BOULLOCHE, as results of their bacteriological studies made with saliva of children suffering from measles, offer the following statements (*Revue Mensuelle des Maladies de l'Enfance*, April, 1891):

The pneumococcus and streptococcus are met with in the saliva of children suffering from measles with much greater frequency than is the case in health. Broncho-pulmonary complications in the course of measles only occur with but rare exceptions in children in whom the saliva contains the pneumococcus and streptococcus. At the autopsy in fatal cases it is possible to follow the pathogenic microbes recognized in the saliva throughout the upper air-passages down to the finer bronchi. The frequent presence of the pathogenic microbe in children suffering from measles serves to explain the great frequency of broncho-pulmonary inflammations in such cases. The practical deduction to be drawn from this conclusion is that during the progress of a case of measles the most rigorous attention should be paid to buccal antisepsis.

INTERLOBAR PLEURISY.

PROFESSOR POTAIN contributes a paper to *L'Union Médicale*, No. 27, 1891, dealing with the subject of interlobar pleuritic effusions. A typical case is recorded where pus is periodically evacuated through the bronchi,

and in which there are evident signs of fluid effusion in front of the upper lobe of the left lung, but not in the general pleural cavity, the fluid being probably localized by firm adhesions. The diagnosis of such cases is always difficult, and a localized collection of fluid may frequently be mistaken for a solid mass unless due precautions are taken. They commonly occur as interlobar effusions or as effusions between the lung and the diaphragm. In either case they are almost always purulent. The occurrence of frequent rigors and a dry cough, if not due to congestion or accompanied by signs of a general pleurisy, should always suggest the possibility of interlobar effusion. Physical signs may not at first be present, but show themselves as the fluid approaches the surface. It is usually evacuated through the bronchi, setting up a certain amount of irritative bronchitis in the process. The opening into the lung is usually small and irregular, and it is rare for air to escape from the lung into the abscess cavity. In cases where such escape does take place, it generally happens that putrefactive changes are set up in the fluid which remains behind, and this necessitates an operation to evacuate and disinfect the cavity. In cases such as the one related, where there is no evidence of change taking place in the pent-up fluid, no operative measures are proposed. Unlike a general empyema, the interlobar form shows a marked tendency to spontaneous cure.—*British Medical Journal*, April 4, 1891.

HYDROCHLORATE OF AMMONIUM BY INHALATION IN MEMBRANOUS CROUP.

In the *Medical Record* for April 11, 1891, Dr. Dwight L. Hubbard calls attention to the use of hydrochlorate of ammonium in laryngismus stridulus and laryngo-tracheal diphtheria.

Dr. Hubbard believes that this ammonium salt is of value, in the first place, as a heart stimulant, producing better oxidation of the blood, by bringing it in more frequent contact with the inspired air; second, in relieving the spasm and œdema of the glottis; and, third, in softening the false membrane. His method of employing this remedy is to place the patient in a small closed room, having a temperature of about 80° F., then generating sufficient heat to drive off copious fumes. This is continued for fifteen minutes, and repeated every hour; while after each application the room should be ventilated as much as possible without reducing its temperature. Dr. Hubbard writes that, after the use of this remedy so employed copious perspiration follows, the breathing becomes less stridulous, the mucus softer and more easily expectorated, and sleep generally is produced.

THE PHYSIOLOGICAL EFFECTS OF TRIMETHYLAMINE.

At the meeting of the Société de Biologie, held March 15, 1891, Drs. Combemale and Brunelle (*Le Progrès Médical*, March 21, 1891) reported that, whether given by the stomach, subcutaneously, or by inhalation, the immediate effect of the administration of trimethylamine is to excite excessive secretion of saliva and increase of its normal alkalinity. In addition to these constant symptoms there is frequently also an increased secretion of the nasal mucus and the lachrymal secretion, while small quantities of albumen can usually be detected in the urine for several days after the administration of trimethylamine. Injected under the skin in watery solution weaker than one-half of one per cent., it produces sloughs and ulcers which are extremely indolent in healing. In the strength of one-half of a grain for every two pounds of body-weight, there is always a reduction of temperature, while at the same time there is an increase in the rate of pulsation of the heart. The minimum fatal dose is about five grains for every two pounds of body-weight.

THE COLD-BATH TREATMENT IN TYPHOID FEVER.

But little has recently been heard as to the treatment of typhoid fever by cold bathing. The general opinion has, however, been frequently expressed that to settle the value of this method of treatment two carefully-recorded series of cases should be published, the one treated in the ordinary way, expectantly, and the other treated systematically, without selection, to cold bathing; each series to be consecutive and sufficiently long to eliminate chance mortalities, and the two to be strictly comparable in all respects save only the one item of treatment. These conditions are, we believe, fulfilled in a paper published in the *Practitioner* for March, 1891, by Dr. F. E. Hare, from the analysis of the cases occurring under his care in the last five years in the Brisbane Hospital, Queensland. It seems that Dr. Hare has had exceptional opportu-

nities for the study of this disease, as judged by the excessively large number of cases which have been admitted into the hospital. He writes that from August 1, 1885, to December 1, 1886, there were five hundred and eighty-six cases of typhoid fever admitted to the hospital. During most of the time the treatment was merely expectant, although at the latter part of this period—sixteen months—quinine was rather freely used in antipyretic doses. Not more than two or three cases were bathed, but cold sponging was frequently used, and the cold wet sheet not uncommonly, in cases of high temperature. Of these five hundred and eighty-six, eighty-five died, giving a percentage mortality of 14.5. Comparing these figures with the records of typhoid fever cases admitted to this hospital from May 15, 1882, up to December 31, 1886, eighteen hundred and twenty-eight cases have been treated in the hospital, of which two hundred and seventy-one had proved fatal, giving a mortality percentage, therefore, of 14.82. It therefore seems that the percentage of deaths occurring in this series of cases might be fairly taken as giving an average mortality from the ordinary hospital expectant method of treatment of typhoid fever, and Dr. Hare uses this as a control list to compare with the results of the cold-bath treatment. For the three years during which the cold-bath treatment was systematically employed eleven hundred and seventy-three cases were admitted. Of these, ninety-two died, thus making the percentage mortality 7.84. In other words, under the bath treatment there was an improvement in the hospital mortality almost amounting to fifty per cent. The treatment consisted in the strict application of Brand's rule, which is, briefly, a cold bath (68° F.) of about fifteen minutes' duration every three hours, day and night, should the rectal temperature reach 102.2° F. Of course, a considerable number of milder cases do not require this uniform bathing, from failure of the temperature to attain this height. In addition to the bathing, quinine was occasionally given in antipyretic doses of 3, 5, and 7 grains. Occasionally, also, it is stated that antifebrin was given in 5 grains, where the temperature was especially obstinate to the bath.

The diet consisted of milk and beef-tea; whiskey was given in severe cases, but after the value of quinine as a cardiac stimulant was recognized, rarely more than six ounces of whiskey were found necessary even in the severest cases. Diarrhœa, meteorism, and hemorrhage were treated by constant appliion of ice-bags to the abdomen. The mere statement of the reduction of mortality in these two series of cases cannot by itself claim the fullest confidence in the character of the results, for every such conclusion is open to the objection, in the first place, of an insufficient number of observations; 2, variations in the extension of the term typhoid; 3, variations in the severity of the disease in different countries, climates, and districts, and in different epidemics in the same place; also differences in the age and sex constitution of the series compared; and, finally, errors in diagnosis.

Dr. Hare has, however, considered all of these possible objections, and has, we think, successfully eliminated various fallacies which might occur in such an investigation. As regards the first of these,—as to the number of cases,—it is evident that, roughly speaking, the number required on which to base any reliable conclusions in any disease will vary inversely in the standard mortality of the disease in question. In acute traumatic tetanus, an almost invariably fatal affection, a very few successful cases would be enough; with a disease whose standard mortality was fifty per cent., the list would have to be considerably extended; while in the case of typhoid, in which the majority attacked recover under any treatment, or even in spite of treatment that is positively bad, a very large number of cases would be required. To show the value of his series of typhoid cases, Dr. Hare groups the eighteen hundred cases into four different series of various sizes, each being consecutive in the order of admission, whose average mortality was 14 9 per cent. He finds that, as might be expected, in the small groups, say of one hundred, there being great variation in the character of the affection, in eighteen of such groups the percentage mortality varied from eight to twenty-two per cent.; in other words, giving a variation of fourteen per cent.; while, when he grouped the cases into three series of six hundred each, there was only one per cent. of variation in mortality. Therefore, the first objection seems to be answered,—that is, in this series of cases the probable error in percentage mortality attributable to variations in the intensity of the disease is insignificant. As regards the second possible error in the extension of the term typhoid, the objection here is somewhat similar to that which occurs under the fourth head of errors in diagnosis. The inclusion in typhoid tables of the milder and indefinite varieties of fever, such as febric-

ula, simple continued fever, etc., is a recent and to some extent justifiable tendency, and yet for statistical purposes it is evident that some definite standard is required. Great difficulty was at first experienced in the classification, and in many instances fatal cases of unmistakable true typhoid fever were not infrequently noted where diarrhœa, meteorism, abdominal symptoms generally, and even the rash were absent.

Dr. Hare therefore determined in this classification to take the duration of the pyrexia as a basis, since in Brisbane typhus fever is unknown and malaria met with only in its intermittent form, typhoid is practically the only fever that exists. Accordingly, Dr. Hare states that all cases that convalesced the tenth day of the fever were excluded, even although undoubtedly many of these were of a typhoid nature. Dr. Hare then makes four divisions, —the first group including all cases usually termed typhoid, simple continued fever; the second excluding cases that convalesced before the tenth day; the third excluding cases that convalesced before the fifteenth day; the fourth excluding cases that convalesced before the twentieth day, and always including fatal cases. According to the expectant treatment, percentage mortality of his cases in the first group was 12.59; under the bath treatment, the same class, 6.69. In the second group, the percentage mortality under expectant treatment was 14.50; under the bath treatment, 7.84. In the third group, under expectant treatment, 16.50; under the bath treatment, 9.29. In the fourth group, percentage mortality under the expectant treatment was 20.09; under the bath treatment, 11.92. Thus it is seen that in all of these groups there is a percentage reduction in mortality in favor of the bath treatment of nearly fifty per cent. The possible variations in disease, owing to the severity of the climate and other local causes, have not in the present instance any importance, since all the cases in each series came from the same districts and were treated in the same wards.

Sex constitution varies but slightly from year to year, and in long series is practically identical. Of the eighteen hundred and twenty-eight cases expectantly treated, six hundred and sixty-eight, or 36.54 per cent., were females; of the eleven hundred and seventy three in the bath period, four hundred and thirty-four, or 36.99 per cent., were females. Sex constitution has, however, a powerful influence upon the success of the bath treatment, as will appear later.

Age constitution is of less importance in typhoid than many other diseases. Only at the two extremes of life is its influence at all considerable, the mortality being lowest under 10 and highest over 40. Of the five hundred and eighty-six cases in the expectant period, 1.08 per cent. were under 10, and 4.33 per cent. over 40. Of the eleven hundred and seventy-three in the bath period, .68 only were under 10, and 6.48 over 40. So far, therefore, age constitution would tell against the latter period, but practically its influence may be neglected.

With regard to variations in severity in different epidemics, seasons, etc., it has been urged that the reduced death-rate at the Brisbane Hospital during the three years' bath period is largely, if not wholly, due to the type of the disease having become milder. Were this true, similar variations should have been met with previously. But it has been shown that such variations only occurred in the smaller series, disappearing almost entirely in those containing six hundred and upward.

Similarly, it can be shown that whatever variations existed in the different *fever seasons*, before the introduction of the bath treatment, were but slight. In Queensland, the prevalence of typhoid follows almost exactly the same rule as in England, being at its minimum in the spring month of September, at its maximum in the autumn month of March. Consequently, if we take the year between September and September, we shall include the whole of a single fever season.

The annexed table shows the death-rates of the four complete fever seasons before the introduction of the bath treatment:

TABLE.

Season.	No. of cases.	Deaths.	Percentage mortality.
September, 1882, to September, 1883...	222	29	13.06
September, 1883, to September, 1884...	568	88	15.49
September, 1884, to September, 1885...	399	58	14.54
September, 1885, to September, 1886...	457	69	15.10

From this it appears that the natural seasonal variations were inconsiderable, and, if we except the first, containing but two hundred and twenty-two cases, did not amount to one per cent. The presumption, therefore, is, that during the succeeding three years the

type remained fairly constant, in the absence, of course, of any evidence to the contrary.

Now, to point to the lower fatality of the disease as a proof of its greater mildness is to ignore the question of treatment,—the point at issue. Such an argument, of course, is simply begging the question, and is logically absurd. But, apart from this, it is very difficult to adduce any facts in support of the theory of alteration in type.

On the other hand, there is a considerable amount of evidence pointing in the opposite direction. On comparing the two periods, it is found that, omitting relapses, the average duration of cases that recovered (where it was possible to fix the date of onset) was almost identical in each, being 23.8 days in the expectant and 24.3 days in the bath period. But by far the most conclusive argument in favor of the identity of type of the two series is found on analyzing the immediate causes of death. Here will be shown that certain complications and accidents, notably intestinal hemorrhage and perforation, which bath treatment could scarcely be expected *a priori* to prevent, have been almost equally frequent in either. To further support the contention, therefore, it would be necessary to assume that the change of type was of so selective a nature, that while it greatly reduced the general mortality of the disease, it left the dangers arising from the intestinal lesion practically unaffected.

Finally, as to the fourth possible fallacy in the value of such conclusions,—that is, as to the fact that the diagnosis is to be made so early that there is no certainty as to its correctness. This objection, however, scarcely applies to these series, for this diagnosis is here not made at the beginning but at the termination of the case; accordingly, the bath was used in all febrile cases which were sufficiently severe, while the diagnosis, and therefore the grouping of the cases in the series, was only regarded in successful cases after their discharge after a careful review of the history, chart, and clinical notes, and in fatal cases after the autopsy. Of course, then, it follows that, in a long series of cases, many other diseases than typhoid would be treated; although many of this disease have been benefited by the bath treatment, they are not included in Dr. Hare's tables. Again, in every such series of cases there must be a great number of cases which are doomed under any circumstances, and these must to a great extent obscure the effect of treatment.

Thus, of the ninety-two fatal cases that occurred during the bath period, eight took place in less than fifty hours from admission, and two more in less than seventy-two, while in seven others the treatment was deemed inapplicable for various reasons. These were, in four, extreme prostration either from pre-existing disease (fatty heart, old hip-disease, and senile decay) or complications present on admission (acute nephritis), in three the fact that the disease was not diagnosticated during life. Of these latter, one had numerous articular abscesses, with a history of acute rheumatism, one was thought to be acute phthisis, and the other was admitted with all the symptoms of dysentery. The last died from perforation of the rectum, and the autopsy showed that the dysentery had been secondary to a recent attack of typhoid.

In yet two other cases death was but very indirectly due to the fever. In one acute cystitis developed, being probably due to a dirty catheter; in the other, an ineffectual attempt to pass an instrument through a tight urethral stricture caused rigors, hyperpyrexia, and death. In this case the bladder was found post mortem to have a capacity of only five ounces, and the walls to be enormously thickened, while in both the intestinal ulceration was practically healed.

Excluding, therefore, these nineteen cases, as not bearing upon the question of treatment, the hospital mortality for the three years, extending over a series of eleven hundred and fifty-four cases, falls to 6.33 per cent.

Hitherto the influence on the general mortality only has been considered, but this is obviously inadequate in dealing with a disease where death threatens from so many directions. The two ever-present dangers are (1) the pyrexia, common to all continued fevers, and (2) the intestinal lesion, peculiar to enteric; and to either, or both of these, most of the deaths might be referred. *A priori* it could hardly be expected that the treatment would influence the latter, at any rate favorably, and therefore it is in the highest degree desirable to settle the point by statistics.

Unfortunately, a difficulty here arises,—death is so frequently due to a co-operation of the pyrexia and the intestinal lesion, that it is manifestly incorrect in many cases to attribute it solely to either. Especially is this so where diarrhœa, meteorism, and other abdominal symptoms have coexisted with prolonged high temperature.

There are, however, two modes of death,—viz., perforation and hemorrhage,—which should properly be regarded as incidents,

inasmuch as they are the result of the depth of the ulcer, and not of anything in its specific nature. They are, at any rate, undoubtedly due to the intestinal lesion and to it alone. Consequently, no question of classification need arise to prevent their relative frequency in the two series from being determined statistically.

Of the five hundred and eighty-six cases treated expectantly, seventeen died from perforation and eleven from hemorrhage. The percentage mortality (to total cases), therefore, of each accident was 2.90 and 1.88, respectively, or together, 4.78.

Of the eleven hundred and seventy-three cases during the bath period, thirty-four died from perforation and sixteen from hemorrhage. The percentage mortality of each, therefore, was 2.90 and 1.36, respectively, or together, 4.26.

Hence it is plain (1) that, instead of being more common under the bath treatment, as many have feared, death from these two complications has been actually, though slightly, less frequent; and (2) that the decrease, such as it is, is altogether due to the diminished frequency of fatal hemorrhage.

It is to be observed that the figures quoted relate to the mortality caused by these accidents and not to the frequency of their occurrence. In the case of perforation, which is almost of necessity fatal, the distinction is without importance, but it is otherwise with hemorrhage, which, as a matter of fact, has occurred as frequently (though not more so) under the bath treatment as before. Its diminished mortality is, no doubt, to be explained by the fact that the patients have been in better condition at its onset, and therefore the better able to recover from the loss of blood.

The conclusion, therefore, is that the treatment has no effect upon the occurrence of perforation or hemorrhage, one way or the other, but that it renders the latter slightly less dangerous.

Modes of Death other than the above.—Obviously it is among these that the main source of the reduced general mortality must be sought.

During the expectant period the deaths under this head were fifty-seven; their mortality to total cases, 9.73 per cent.

During the bath period they numbered forty-two, their mortality being, therefore, 3.58 per cent. Here, then, is a reduction amounting to over sixty-three per cent.

Now, some of the causes of death in this list are well defined and undoubtedly "pyrexial" in origin, inasmuch as they are liable to arise in any severe continued fever. They are:

a. Chest affections,—*e.g.*, pneumonia, empyema, etc. Simple hypostatic congestion of the lungs is not here included.

b. Cerebral affections,—*e.g.*, acute mania, general convulsions, apoplexy, etc.

a. Fatal chest affections have thus been less than one-fourth as frequent. Of the six in the bath period, one was from empyema, which had become chronic, and proved fatal six months after the subsidence of the fever; three from acute lobar pneumonia, in all of which the complication developed suddenly and rapidly, and carried off the patient; and two only were from broncho-pneumonia, in one of which it was present on admission, and led to a wrong diagnosis.

In only one instance, therefore, during the bath period, did fatal broncho-pneumonia develop subsequently to admission.

The greater success attained in averting broncho-pneumonia, by means of the bath treatment, is quite in accord with what is known of the pathology of the disease. Its immediate antecedents are plugging of the terminal bronchioles and collapse of the lung-sacs, preceded in most instances by bronchial catarrh. Its development is favored by feebleness of the circulation, muscular prostration, and a state of mental torpor, during which the patient fails to appreciate the necessity of coughing. Consequently, it always occurs late in the disease.

The causation of the lobar variety seems more obscure. It is not usually preceded by bronchial catarrh, and it is liable to arise at any period in the disease, as often as not before there are any signs of cardiac failure, of which, indeed, it may be the immediate cause.

No surprise, then, need be felt that the bath treatment should be more effectual against the bronchial form, each immersion causing, as it does, increased intellectual clearness, deep inspirations, and powerful coughing efforts, followed by expectoration of any mucous plugs that may be blocking the tubes, besides acting undoubtedly as a powerful prophylactic against circulatory failure.

b. The deaths in this class are only those in which some well-marked cerebral complication developed at a time when as yet no other threatening symptoms had appeared; in which death rapidly followed, and in which, therefore, it is fair to assume that it

proceeded chiefly, if not solely, from the brain. These cases were acute mania, general convulsions, apoplexy from subarachnoid hemorrhage, and one unusual case of coma.

Although the mortality in this class is seen to have fallen to exactly one-quarter, yet the cases are too few to be in themselves conclusive. For this reason Dr. Hare has added an analysis of the cerebral *symptoms*. These, by which are meant the ordinary forms of delirium, stupor, etc., but rarely prove fatal directly, yet without doubt they are important contributory causes of death.

Of the nine hundred and thirty-four cases admitted during the years 1888 and 1889, delirium or stupor occurred in seventy-one, or in 7.60 per cent. only. Murchison found these symptoms present in sixty-seven per cent.

Even more convincing, however, is a consideration of the circumstances under which the symptoms arose in these seventy-one cases. All the cases of stupor (nine), and twenty-five of those delirious, were so on admission. Of the remainder, twenty-four became delirious for the first time, only after the bathing was stopped for various reasons. Such reasons were, in some instances, the onset of a contraindicating complication (hemorrhage, perforation); in others, simply a falling temperature, which rendered the continuation of the treatment unnecessary, and which, in fact, indicated the approach of convalescence. Two more cases were not bathed at all. There remain only eleven, therefore, out of the nine hundred and thirty-four cases in which any kind of mental disturbance arose during the continuance of the bathing, and where, consequently, it may be said to have occurred in spite of it.

c. The mortality of this class is seen to have been reduced from 6.82 per cent. to 2.89, or nearly fifty-eight per cent. It constitutes, as already said, a residuum. In it are included most of the causes of death termed pyrexial, together with others due to the intestinal lesion. No accurate comparison can, however, be made between the two periods, for two reasons,—1, because the distinctions between the influence of the lesion and of the pyrexia are not always sharply defined; and, 2, because during the expectant period, the record was not sufficiently minute.

Analyzing the thirty-four cases in the bath period, it seems that some cases hardly bear upon the treatment at all. Thus three died from abortion, while in five death was due to altogether exceptional causes or clearly dependent upon pre-existing disease. In twelve cases the intestinal lesion seemed the most important factor; in three of six, exhaustion seemed to be the immediate cause of profuse diarrhœa, showing a more favorable percentage than was met with in the series of cases treated by the expectant method, while in the remaining nine cases death undoubtedly resulted from dysentery. There yet remains fourteen cases in which there was no special discoverable cause for death, and in which the fatal event, therefore, must be attributed simply to pyrexial cardiac failure. This also was a much more prominent cause of death during the series treated by the expectant plan; and, in fact, it seems in rendering this source of death infrequent that the bath treatment is so eminently efficacious. In support of this, it will be found on examination that most of the fourteen cases in this group were admitted under circumstances that were highly unfavorable.

Thus no less than four were practically moribund on admission and died within seventy-two hours; four were admitted during the fourth week of the fever or later, two during the third, two during the second, and two only before the end of the first. The significance of this can be appreciated when it is known that more than fifty-three per cent. of the total cases were admitted during the first week of the disease. Dr. Hare believes that his records warrant the statement that this mode of death was five times more prevalent in the series of cases treated under the expectant plan than in those in which the bath treatment was rigorously followed.

Again, Dr. Hare lays the greatest stress upon an absolutely strict adherence to Brand's rule, already referred to.

Finally, after discussing the influence of delayed admission upon the hospital death-rate of typhoid, and on the variation in mortality in the two series, the author summarizes his conclusions as follows:

1. That by means of the bath treatment, systematically employed, the hospital death-rate of typhoid may be greatly reduced.

2. That the reduction should amount to fifty per cent. on the previous death-rate; and that the percentage mortality to admissions should not be over eight per cent. (always supposing the term *typhoid* to be used in its second degree of extension).

3. That this result may be obtained in spite of the fact that many of the cases are unsuited to the treatment, and that much more might be expected in appropriate cases only

4. That the success is in proportion as the treatment is begun early in the disease.

5. That, as evidenced by the undiminished occurrence of perforation and hemorrhage, and by the fact that early admission has failed to render them less frequent, the treatment has no influence on the depth of the ulceration.

6. That, since a constant percentage (about four and a quarter) of the cases admitted die from these accidents, no reduction in the general mortality much below five per cent. can be expected from the treatment, even were it possible to insure every case being admitted under the most favorable circumstances.

7. That, as the result of the different liability of the sexes to these accidents, the prognosis under the bath treatment is vastly more favorable in females than in males. For instance, in any two given cases, *cæteris paribus* and without reference to the date of fever on admission, the danger to life is but little more than half in the case of the former; while if both are admitted during the first week of the fever, this is reduced to one-quarter.

8. That, on the whole, the lethal influence of the intestinal lesion is diminished; that the treatment affects this (*a*) directly, by moderating diarrhœa, and (*b*) indirectly, by sustaining the powers of the patient, and thereby enabling him to recover from the effects of the hemorrhage and other not necessarily fatal intestinal conditions.

9. That the vast bulk of the reduction in mortality is due to the prevention of those complications and modes of death which, being more or less common to the febrile state, however induced, have been termed pyrexial. Thus (*a*) fatal pneumonia has been less than one-fourth as frequent, this being chiefly due to the rarity of the bronchial form; (*b*) brain complications have been less fatal, and brain symptoms (delirium, stupor, etc.), enormously reduced in frequency; while (*c*) it is no exaggeration to say that simple cardiac failure would have been practically expunged from the list had all the cases admitted come under treatment during the first week of the disease.

This last conclusion (9) embodies the central truth brought out by the inquiry. For those who are inclined to withhold their assent from it, only one loop-hole remains open, and that is a doubt as to the good faith of the statistician. To meet this to some extent, the original documents which constitute the data of the inquiry have been preserved and filed at the Brisbane Hospital, where they may be examined by any member of the profession who is sufficiently interested in the subject. They include,—1. Most of the charts of the cases in the expectant period. 2. All the charts (with three or four exceptions) in the bath period, with a brief account of the main features in each case, the number and duration of the baths, and their effect on temperature and pulse, and other special therapeutic measures. 3. Post-mortem record, consisting of notes made at the autopsy on one hundred and seventeen of the fatal cases; eighty-seven are from the bath period, no examination being made in the other five. Thirty are from the expectant period. Although post-mortem examinations were only omitted in about seven of the eighty-five fatal cases that occurred in this period, unfortunately the record of the earlier ones was not preserved.

HYPODERMIC INJECTIONS OF GUAIACOL IN PHTHISIS.

Professor Picot, of Bordeaux (*Semaine Médicale*, March 4, 1891), reports the results of therapeutic experiments made during a period of two months in the Hôpital S. André in the treatment of pulmonary tuberculosis and pleurisy of tuberculous origin. He prefaces his report with a declaration that he does not pretend to cure tuberculosis, but only records certain results which he has in certain cases seen follow the use of a solution of guaiacol and iodoform in perfectly sterilized olive oil and vaseline. Each cubic centimetre of the fluid, which is perfectly pure and transparent, contains one centigramme of iodoform and five centigrammes of guaiacol. The supraspinous fossæ were chosen as the seat of injection, as there is not much movement in that region, and it does not bear the weight of the body when the patient lies on his back. The initial dose was 1 cubic centimetre, which was gradually increased to 3; no swelling or other local reaction was ever observed at the site of puncture. In about one case in twenty a certain amount of numbness was felt in the shoulder of the same side after an infection, but this always disappeared in from five to six hours. That the substance injected is absorbed was proved by the fact that iodide of potassium was eliminated in the urine. A small quantity of iodide of potassium was also found in the lungs of a patient who died during treatment. The only sign of general reaction is profuse perspiration, especially of the face and chest, which comes on, as a rule, from twenty to thirty

minutes after the injection. The cessation of the sweating is followed, as a rule, by a fall of temperature from .5° to 1° C. The injections did not affect the digestion, but in some cases, when the treatment had been carried out for a week or ten days, slight colic and diarrhœa were complained of; these symptoms ceased on discontinuing the injections. No effect on the urine was observed. With the view of determining whether the remedy could give rise to fresh crops of tubercles, Dr. Picot used the injections "in three phthisical subjects in whom the considerable lesions could not be checked in their progress, and who were likely at an early date to allow of the wished-for anatomo-pathological examination." One of these, a man, aged 55, with cavities at both apices, received thirteen injections between January 28 and February 10. He died on February 11, and at the necropsy "it was easy to see that neither in the lung nor in the intestine were there recent crops of tubercles nor any submiliary granulation." Another patient, aged 19, both of whose lungs were riddled with cavities, underwent a series of injections from January 16 to 31. He died on February 21, and no recent granulations or submiliary tubercles were found. The third case gave similar results. These post-mortem examinations proved that the injections do not set up congestion around old tuberculous foci nor in the interior of cavities, and hence that there is no danger of their causing inflammation of the pulmonary tissue or hæmoptysis. The total number of patients treated has been twenty-five (fifteen men and ten women). Of these, as already said, three died "from the natural consequences of pulmonary phthisis which had reached the last stage." Even in these, however, some little objective improvement was noted, especially in the quantity of expectoration. It was remarked at the post-mortem on these cases that the cavities contained neither caseous material nor pus. In one of the cases in which there were tuberculous ulcers in the intestine, these showed signs of commencing cicatrization. In the remaining twenty-two cases the existence of phthisis was absolutely proved, both by the physical signs and by the presence of bacilli in the sputum. In two cases "with manifest cavities" and other signs of advanced phthisis, the treatment was followed by almost immediate improvement; expectoration and cough ceased, the temperature became normal, night-sweats disappeared, appetite returned, and weight was gained. In one of these cases the physical signs were so modified as to indicate that the excavations were much diminished in size. The bacilli were much fewer in one case; in the other, as there was no expectoration, nothing could be said as to this point. In six other cases of phthisis in the second stage, the results were still more remarkable. These and the other cases treated will be published by Professor Picot in full detail. During the thirteen years he has been teaching at Bordeaux he has never before obtained such results from any kind of treatment. The cases of pleurisy treated in the same way were eight in number; five of these are still under treatment, and show marked improvement; three have been discharged "cured." Professor Picot sums up the effect of his remedy as follows: The injections improve the general condition, and lessen cough and expectoration. In certain cases they dry up cavities and favor their cicatrization. In the second stage of phthisis they make cough and expectoration disappear, while causing the cessation of fever and night-sweats. They also diminish the number of bacilli in the sputum. Whether this is "cure" or not, time and clinical experience alone can show. Dr. Picot thinks a tuberculous patient should be watched for five or six—perhaps even ten—years before he is pronounced to be cured.—*British Medical Journal*, March 14, 1891.

A NEW OPERATION FOR THE RADICAL CURE OF VARICOCELE.

In the *Lancet* for March 7, 1891, Mr. William H. Bennett describes an operation for the radical cure of varicocele. An essential detail in the operation, after the vas deferens has been isolated in the customary way, is an application through an incision in the scrotal tissues of two ligatures placed at a distance from each other round the sheath. The only available sources of this additional blood-supply are (1) some outlying branches of the spermatic artery, one of which sometimes comes off high up, and so may easily escape division; (2) the artery of the vas deferens, which may not be injured, even though the duct itself be divided; and (3) some small but important anastomotic vessels passing from the subvaginal tissue, which, in cases of congenital hernia, are more than usually large and numerous, in consequence of the modified relation of the tunica vaginalis and the hernial sac. This additional supply, although sufficient under favorable circum-

stances to maintain adequate nutrition of the testicle, is, however, derived from vessels which are, as a rule, small and delicate; any inflammation, therefore, about the part would be sufficient to choke them, sloughing of the organ following as a necessary result. If, however, no inflammation occurs,—*i.e.*, if the wound remains aseptic,—the supply of blood is enough to prevent sloughing and subsequent atrophy. The immediate cause, then, of the death of the testicle, which happened in these cases in the days prior to the practice of surgical cleanliness, as the term is now interpreted, appears to have been not the mere division of the cord, but rather the inflammation and suppuration, one or both of which almost constantly followed upon it.

It is almost impossible to include the whole of the latter vessels in a ligature in a case of varicocele without also including the artery, unless an elaborate and tedious dissection be undertaken for the purpose. It therefore would seem probable that in the vast majority of operations for varicocele, in which the spermatic plexus of veins is divided, that the main trunk of the artery is also involved in the section. It is probable, however, that the belief commonly held, that the nutrition of the testicle is dependent almost entirely upon the integrity of the spermatic artery, led to the conclusion that in operations in which the spermatic veins were freely divided, the artery had escaped injury because no ill effect was necessarily produced upon the testicle. It was then easy to assume that the apparent safety of the vessel was due to its having been pushed aside with the vas deferens. The second point of interest is the effect of this division of the spermatic artery, together with the veins, upon the nutrition of the testicle. The isolated position of this organ, coupled with the accepted view just referred to, that its blood-supply depends almost entirely upon the long and slender spermatic artery, has given rise to the impression that its vitality is endangered by the division of this vessel, together with the spermatic plexus of veins, and that section of the spermatic artery, veins, and vas deferens—virtually the entire cord—is also followed by sloughing of the testis. So strongly is this view held by some practitioners that it is not uncommonly taught, in the event of the cord, including the vas deferens, being divided during an operation, that it is proper to remove the testis at once, not only on account of its having been rendered functionally useless, but especially because if it is left sloughing will surely follow. Mr. Bennett, however, maintains that, in regard to division of the spermatic artery with the veins no harm whatever need result, for the artery of the vas deferens, which is certain to have escaped injury, is by no means always an insignificant vessel, and generally sufficient, by its anastomoses with the spermatic, to prevent not only immediate necrosis of the testicle, but also immediate wasting, as it often receives assistance from other vessels. In support of this statement, Mr. Bennett claims that in numerous cases in which he has operated a portion of the spermatic artery could be demonstrated in the excised part of the cord, and that in none of these instances has there been the least suspicion of wasting. On the contrary, the testicle, when soft or small, has invariably become more natural in size and consistence, and certainly, in one instance, more perfect in a physiological sense. The immediate result of division of the vas deferens with the spermatic veins and artery, whether by accident or of necessity, is naturally to render the testicle functionally useless, as its duct has been severed; but the idea that sloughing of the organ necessarily ensues is certainly not correct. In support of this latter statement, Mr. Bennett publishes notes of three cases, which seem to prove the truth of this latter statement. The fact that the organ survives after such a serious interference with its fluid supply must lie in the fact that there exists a considerable arterial supply over and above that which need be involved in a section of the cord itself. The portion of the cord lying between these ligatures is then excised. The whole of the spermatic plexus of veins, with the exception occasionally of a small vessel lying remotely at the back, are contained within the sheath formed by this fascia, and one object of including it in the ligature is to insure the obliteration of the whole of the veins; for it is clear that if the ligatures are passed round the connective tissue sheath before the vessels are exposed, none of these can escape. Further, if the ligatures are passed in the manner described, not only are the veins with certainty included, but also the main trunk of the spermatic artery, in evidence of which it is the custom, when operating in hospital practice, to demonstrate the existence of a section of this artery in the excised portion of the cord. Two points of interest here arise: First, it is obvious that if the spermatic artery is included in the ligature, as it certainly is under these circumstances, the traditional teaching of the schools,

that the vas deferens when pushed aside carries the spermatic artery with it, is wrong. Practically this is so, for the artery does not go with the vas deferens when it is displaced, but remains either quite close to the spermatic veins, or, as commonly happens in varicocele, is actually surrounded by them.

Finally, the points to which Mr. Bennett especially calls attention may be summed up in the following sentences:

1. That the vas deferens having been displaced in the manner usually adopted in operations for varicocele, the spermatic artery does not accompany it, but remains with the spermatic veins. 2. That in cases of varicocele the division of the main trunk of the spermatic artery, together with the veins, if the ordinary principles of surgical cleanliness be observed, is not only harmless to the testicle, but probably aids in the ultimate relief of the affection by diminishing the pressure of blood going to the testis at the time when almost all the returning veins are suddenly obliterated. 3. That the division of the vas deferens, spermatic artery, and spermatic veins, which entails a section of apparently the whole cord, is not necessarily followed by sloughing, or even subsequent wasting of the testicle, provided that a perfectly aseptic condition of the wound is maintained.

THE NUTRITIVE VALUE OF RECTAL INJECTIONS OF EGG ALBUMEN.

The assertions of Voit and Bauer and Eichhorst to the effect that egg albumen is absorbed by the rectum only in the presence of a certain proportion of chloride of sodium, but is returned unaltered with the fæces if this reagent be absent, has led the author to investigate this point anew, and to make his observations on man, and not on dogs, as his predecessors had done. The experiments were planned with great care, and the quantity of albumen removed from the body, both by the urine and the fæces, was estimated. As the outcome of several series of experiments, the results of which show a great agreement, HUBER gives as his conclusion that egg albumen simply beaten up is absorbed by the rectum, but only in very small quantities, and consequently a nutrient enema of this kind possesses hardly any value. When, however, a certain amount of common salt is added (one gramme (15 grains) to each egg in the present series of experiments), the quantity of albumen absorbed is doubled. Peptonized egg albumen was absorbed in very slightly greater proportion than that treated with common salt. Of the albumen thus treated with salt, between sixty and seventy per cent. was absorbed, and we, therefore, have in this mixture an extremely valuable material for nutrient enemata.

In no case of Huber's were the enemata expelled; nor was albuminuria ever found to occur after their use.—*Medical Chronicle*, April, 1891.

THE TOXIC ACTION OF NICKEL-CARBONYL.

Nickel-carbonyl is a new substance obtained by DRS. MOND, LANG, and QUINCKE by passing a stream of carbonic oxide over finely-divided nickel, resulting from the reduction of the oxide of nickel by hydrogen. Its formula is $Ni(CO)_4$. This liquid is volatile at about 40° C., while its vapor detonates and undergoes spontaneous combustion. These authors reported at the meeting of the Société de Biologie, held March 21, 1890 (*Répertoire de Pharmacie*, April 10, 1891), that they had injected 5 minims of nickel-carbonyl into the veins of a dog with the production of death one hour later. In larger doses it produces instantaneous death. Instilled into the eye it acted as a caustic, but without producing immediate death, as it seemed to be only with difficulty absorbed. Nickel-carbonyl is difficult to handle, not on account of possible explosions, which are without practical danger, and are by no means violent, but because its vapors produce the most excruciating headache. It acts by displaying oxygen from hæmoglobin. It remains, however, to be determined whether the combination which it forms with hæmoglobin is a combination in which the oxide of carbonyl is alone interested, or as to whether one is formed in which the molecular group of nickel-carbonyl enters in its entirety.

THE CAUSE OF INFLUENZA.

The annual meeting of the Michigan State Board of Health was held at the Capitol, April 14, 1891. Professor Fall, Drs. Avery, Hazlewood, Vaughan, and Baker were present. Dr. Avery was re-elected President.

Dr. Baker reported that he had worked out the cause of influenza. He said its greatly-increased prevalence during the last three months is alarming, because so many other diseases follow that disease, and increase after it increases, the diseases which so increase being consumption, pneumonia

cerebro-spinal meningitis, rheumatism, osteomyelitis, etc., influenza seeming to bring in its train all of these most important diseases. Dr. Baker explained the causation of influenza. He stated that the germs of influenza are generally at all times present, and the germs of pneumonia, tuberculosis, and of the other specific diseases are somewhat widely disseminated; but that there must be certain coincident meteorological conditions to irritate the throat and air-passages sufficiently to let the germs gain an entrance to the body. These meteorological conditions in this instance were the excessive prevalence of north and northeast winds, and the excessive amount of ozone during the past three months.

The prevention of influenza, and of the coincident rise in the other more dangerous diseases, has not been possible, because of ignorance of the causes. Now the causes are known, and the study of the measures for the prevention can begin.

Reviews.

A COMPEND OF HUMAN ANATOMY. By Samuel O. L. Potter, A.M., M.D. Fifth edition, revised and enlarged.
Philadelphia: P. Blakiston, Son & Co., 1890.

While this edition has been greatly improved by the addition of numerous cuts, tables, and plates, particularly of the arterial and nervous systems, it can be no longer said, as of former editions, that it "closely follows Gray," as the last edition of that book has apparently not been consulted in the work before us. Various typographical errors which appeared in former editions have been corrected and the book enlarged, until it now numbers three hundred and fifteen pages.

It is unfortunate that a larger type and heavier paper have not been used, which, while they might have added to the bulk of the book, would have unquestionably also enhanced its value.

TRANSACTIONS OF THE TEXAS STATE MEDICAL ASSOCIATION, Twenty-second Annual Session, April, 1890.
Austin, Tex.: Eugene Van Boecktmann.

As usual, the "Transactions of the Texas Medical Association" contain many very valuable papers, among which may be mentioned a "Report of Five Cases of Intracranial Surgery," by Dr. H. L. Fountain; "Comminuted Fracture," by Dr. F. W. Powell; "Cancerous Breast Removed," by B. F. Brittain; "Cerebro-Spinal Meningitis," by J. D. Burch; and the "Treatment of Chronic Tubercular Consumption," by J. C. Smith.

ESSENTIALS OF ANATOMY. By Charles B. Nancrede, M.D. Third edition, revised and enlarged. Based upon the last edition of "Gray's Anatomy."
Philadelphia: W. B. Saunders, 1890.

The reputation of Dr. Charles B. Nancrede as a surgeon and anatomist renders any comment on his writings upon these subjects useless. The colored plates which have been introduced into this last edition, the editing of which was supervised by Dr. Edward Martin, have added materially to the value of the work. They are clear and well colored, and are anatomically correct, which, unfortunately, is not always the case with anatomical plates. As this book is one of "Saunders's Question Compends," it was, unfortunately, necessary to write it in the form of questions and answers. Dr. Nancrede has, however, inserted as few questions as was compatible with the nature of the work.

It is to be observed that many of the questions are not followed by a note of interrogation. The plates on "Osteology," with which the work ends, are taken from "Gray," and should prove a help to the student.

A LATIN GRAMMAR OF PHARMACY AND MEDICINE. By D. H. Robinson, Ph.G. With an Introduction by L. E. Sayre, Ph.G.
Philadelphia: P. Blakiston, Son & Co., 1890.

In this excellent little book the authors have endeavored successfully to present a great deal of knowledge in the smallest possible space. It is unfortunate that the students of pharmacy and of medicine should not have a sufficient acquaintance with the Latin language before commencing their studies to render such a book useless; but, as this is not the case, and as a knowledge of the rudiments of the Latin are of great service to professional men, we feel that we cannot do better than thoroughly recommend the work before us, fearing, at the same time, that few students possess the leisure or the inclination to study it as they should. H. M.

THE THERAPEUTIC HANDY REFERENCE-BOOK FOR PHYSICIANS. Third edition.
Philadelphia: William R. Warner & Co., 1890.

This little manual, now in its third edition, contains in convenient form much that is of value to the practitioner of medicine. The rules for prescription-writing are followed by

tables showing the equivalences of apothecary's weight and the metric system, from grains and drops to ounces and gallons. The chapter upon poisons and their antidotes has been carefully revised and brought down to date. The tables of doses are very complete. The work concludes with a valuable formulary, where each prescription is placed under the disease for which it is useful. Many of these formulæ are the standard prescriptions used by well-known authorities in medicine from all parts of the world.

TEXT-BOOK OF MEDICAL JURISPRUDENCE AND TOXICOLOGY. By Jno. J. Reese, M.D., etc. Third edition, revised, and enlarged.
Philadelphia: P. Blakiston, Son & Co., 1891.

The third edition of Dr. Reese's work indicates that it possesses a hold upon the profession from its own intrinsic value, a view which is confirmed by a study of the book. Simplicity of style, conciseness, and directness of purpose have rendered it one of the best guides extant to the study of medical jurisprudence. The author has revised and somewhat enlarged it in the present edition, but it is still a compact, handy work, answering all the requirements of the student, except where recourse is necessary to the vastly larger works on the subject, which the newest medical library affords. E. W. W.

ANNUAL REPORT OF THE SUPERVISING SURGEON-GENERAL OF THE MARINE HOSPITAL SERVICE OF THE UNITED STATES FOR THE FISCAL YEAR 1890.
Washington: Government Printing-Office, 1890.

This report contains several papers of interest in the shape of reports. The opening pages contain a review of the progress of the "grippe epidemic," from which we learn that the earliest cases to be ascertained were observed in October, 1889, in Vjatka, Russia. To this there may be some objection, since it is well ascertained that the epidemic influenza existed in a distant but populous portion of the globe as far back as 1884–85. The report states that one fact is supported by general observation,—viz., its genesis in the north, and its dissemination by means of east winds. Ninety million persons are estimated to have been attacked in Europe in 1889–90, or about twenty-five per cent.; while in large cities one-half to two-thirds of the population suffered. The estimated mortality is enormous. Calling it one per cent., nearly a million deaths are laid to its charge; or at one-half per cent. even, and the figures are astounding, and the permanent sequelæ left will eventually largely increase the mortality. This estimate, it should be remembered, deals only with its first outbreak. The present recurrence is probably far more deadly. The report of the work done in the Hygienic Laboratory, United States Marine Hospital, New York, will be interesting to many. The "plasmodium malariæ" has been studied still further, and the results are confirmatory of the statement already made, "that malarial disease is contracted through the medium of food and drinking-water, the parasite gaining access to the system through the alimentary tract." This position established, calls for a considerable modification of our previous views, and also a change in our hygiene, which all should remember. The volume contains what seems to us only a medical curiosity, in the matter of the claim of Mr. F. A. Perroux, of Calcutta, as to the cure of cholera by inoculating with cobra venom. This claim is based upon the difference of action of cobra venom as compared with the venom of other serpents, and the fact that while lethal to cholera germs, its action does not in human beings coagulate the blood. A number of experiments on animals have been made, but the value of the venom as a cure for cholera fails to be established.

The book contains pictures and plans of many noted hospitals in Europe, and many reported cases of various forms of disease as noted in the hospitals of the service.

E. W. W.

SEXUAL NEURASTHENIA (NERVOUS EXHAUSTION): ITS HYGIENE, CAUSES, SYMPTOMS, AND TREATMENT, WITH A CHAPTER ON DIET FOR THE NERVOUS. By Geo. M. Beard, A.M., M.D., etc. Posthumous manuscript. Edited by A. D. Rockwell, A.M., M.D., etc. Third edition, with formulas.
New York: E. B. Treat, 1891.

The issue of a third edition of this book will again call attention to its value. Perhaps the author was a little too positive. He certainly was a little too advanced for his turn, but the book contains ideas of great value. His key-note is the discovery, which he seems to claim for himself, that sexual affections of the male organs are as much the cause of aberrations from health in the male as similar female sexual diseases are in her the causes and origin of a vast number of symptoms and conditions. At the present time medical fashion is drifting in two directions. It is abandoning the much-vexed uterus, and forbidding the endless detail of "treatment," so long in vogue. Yet it is still asserting its belief in deranged sexuality as a cause of di-

ease by its growing ovariotomies and extirpations of organs. In short, it believes more than ever that the organs are offenders. It believes less and less in anything short of radical measures,—viz., their removal. So that while at first sight one might think that Dr. Beard's reasoning from analogy was less forcible than in the old days of the "irritable uterus," a closer view shows us that we still believe in the principle, and act upon it, only more vigorously.

Dr. Beard would explain by sexual derangement and functional diseases of these organs that vast mass of cases, growing daily more vast, where some hitherto unknown cause has deranged the functional perfection of the system. The break-downs, the nervous exhaustion, the special deviations from health in function, as well as the general collapse. Yet he gives a place for all the other acknowledged causes; in fact, sums them all up in the one word "civilization." These cause sexual neurasthenia. Yet it is by their action in deranging the sexual organs that he thinks he sees a hope of cure in his theory. "Civilization" is a great word and a greater fact, but one cannot attack it or cure it. The prostate gland is a much smaller fact, but amenable to treatment. Civilization, with its excesses, spirits, tobacco, wear and tear, deranges the prostate, the prostate deranges the man. Here is something definite to attack and something which we may hope to cure. Possibly the hope, as in the case of the gynæcologist, may prove illusive, and the androcologist of the future may be driven, like his brother of to-day, to extirpation. This specialty, by the irony of fate, will probably fall into the hands of the female practitioner, from whom radical measures may be expected.

The dryness of the American climate is by the author considered as the reason why neurasthenic diseases are more frequent among us. The extremes of heat and cold are also causes. These we acknowledge, but it is a question whether our climate be really dry. There is enough, however, to account, without this factor, for the abnormal strain under which we labor. Very probably transplantation of any race from its normal habitat leads to abnormal development. Possibly, by the fusion of races going on, as a vast experiment in our land, we are breeding a stock deficient in nervous stability. At all events, writers, both here and elsewhere, seem to acknowledge the fact, and agree with our author.

For the relief of what the author considers are the causes of neurasthenia, we must refer the reader to his own chapters. Electricity is his main reliance. Diet and regimen, with advice based upon the dictates of reason and common sense, supply the rest. One would err who classed this book with the great array of works on spermatorrhœa and impotence, which, after all, tell us so little. Dr. Beard had much to tell, as the reader will discover if he peruse this book with care.

E. W. W.

THE DAUGHTER: HER HEALTH, EDUCATION, AND WEDLOCK. HOMELY SUGGESTIONS FOR MOTHERS AND DAUGHTERS. By Wm. M. Capp, M.D.
Philadelphia and London: F. A. Davis, 1891.

This is one of a large class of books concerning which little and much may be said. Little, for there is nothing absolutely new in it; much, for its old saws are well said, well selected, and can hardly be too often repeated. The book is full of good, common-sense advice. You can get it from other books, perhaps, but you certainly can from this. There are so many things about which the public never get accurate knowledge, that, at the risk of publishing another book very much like many already in print, it is worth while to try it. We have read Dr. Capp's book through, and can truly say that very little fault can be found with it. It is a vast mass of axiomatic truth therein carefully collected and always worth remembering.

E. W. W.

Correspondence.

BERLIN.

(From our Special Correspondent.)

The season of medical congresses opens with the spring. This year, however, spring is found only in the calendar, for the weather is so cold and wet that it resembles November more than April, and consequently diseases usually regarded as due to cold are very prevalent. The causation of these affections was much discussed at the two congresses which have just closed. The Deutsche Gesellschaft für Chirurgie met at Berlin and the Congress für Innere Medicin at Wiesbaden. At both the discussion of Koch's treatment occupied a large part of the proceedings. Professor von Bergmann opened the surgical congress with a paper on tuberculin. At the close he compared Koch's discovery with the old story of the dying

father, who, on being asked by his sons where they would find a treasure he was supposed to have hidden, told them to dig in the orchard. On doing so they found nothing, but the fruit that year was larger and sweeter and more plentiful than ever before, and then they knew what the treasure was. So work and renewed impetus to investigation will be the most valuable result of this discovery. Professor König, of Göttingen, believes it would be very unfortunate if the remedy should be no longer employed, since he has seen cases improve under it more than under any other therapeutic measure. Further, he does not believe that necrosis occurs at the point of action of the solution unless an open ulcer be present, by means of which infection can enter the body from without. Dr. Schede, of Hamburg, regards tuberculin as a very useful weapon in the warfare against disease, and thinks that the varying success in its use depends upon the varying method of its application. Injections, he says, must always be combined with surgical measures, and the initial dose must always be small. It is especially important to remember that there is a possible danger of setting the bacilli free in the circulation, and therefore care must be taken not to reduce the body's power of resistance by causing too great constitutional reaction. The dose may be gradually increased. The interval between the injections must not be too long, since the power of resistance to the remedy established by its use is soon lost. Launstein, of Hamburg, reported results in a number of cases. Von Eiselberg, of Vienna, reported a case of actinomycosis from Billroth's clinic cured by the remedy. Kuster, of Marburg, reports local and general reaction in cases of osteomyelitis, lupus erythematodes, and lipoma.

Senger has experimented with injections of formic acid and iodoform in tuberculous joint-affections with apparently very good results.

It would require too much space to give a complete review of the proceedings of the Congress, and we will confine ourselves to a few interesting and important papers.

Dr. Bender, of Berlin, showed a soldier in whom, after a fall from a horse, epileptic convulsions developed. There had been a wound in the parietal region, which healed of itself. Several months later convulsions appeared. They always began with tremor of the right foot, thigh, and arm, and finally involved the left side also. The skull was trephined, and a portion of brain matter, which, however, showed nothing abnormal, was removed from the motor centre. The convulsions have not returned. Slight weakness of the right forearm and numbness, especially on the ulnar side of the ring-finger, and slight weariness after mental work remain. Professor Gurlt made a report on the use of chloroform. There were 66 reporters and 24,625 administrations of chloroform or ether, as follows :

	Asphyxia.	Deaths.
22,656 pure chloroform	71	6
470 pure ether	0	0
1,055 ether and chloroform	5	0
417 ether and chloroform and alcohol	4	0
27 bromethyl	0	0
	80	6

In 3776 administrations of chloroform, 1 death occurred; in 319 administrations of chloroform, 1 asphyxia occurred; in 211 administrations of chloroform and ether, 1 asphyxia occurred; in 104 administrations of chloroform, ether, and alcohol, 1 asphyxia occurred. In 2732 cases narcosis lasted one hour, and in 278 cases a longer time,—once, 150 minutes; once, 155 minutes; and once, 180 minutes. The greatest quantity of chloroform used was 180 c.c. A few authors always use morphine injections at the time of inhalation, others often, and a few never. Five observers use it often, or almost always, in patients over 15 years; 14 observers used morphine 2194 times out of 6806 inhalations. There was 1 case of asphyxia for every 307 inhalations, whether with pure chloroform or mixed. Tracheotomy was performed successfully in 4 cases; 6 deaths were due to chloroform, and 3 to other causes.

Herr Brun, of Tübingen, reported a case of cystic goitre, in which the growth was so large as to reach nearly to the umbilicus. Operation was successful.

Operative treatment in prostatic disease was exhaustively discussed, and great stress laid upon the necessity of knowing the condition of the bladder, as otherwise urinary trouble may follow. Operations on the gall-bladder were also reported.

Julius Wolf exhibited a girl of 6 years, showing congenital anomalies of most of the joints. She could voluntarily luxate the right knee. There was congenital luxation of the hip-joints and of the radii.

Retin, of Frankfort-on-the-Main, diagnosticated and successfully removed an extradural tumor in the region of the cau-

equina. On examination it proved to be a cavernous lymphangioma.

Besides the above, many interesting papers on surgical bacteriology were read. Among others, Jordan, of Heidelberg, on the etiology of erysipelas; Von Brunner, on the excretion of pathological micrococci by the sweat; Reichel, on immunity from pus bacteria.

On April 4 the corner-stone of the Langenbeck House was laid.

PROFESSOR SEMMOLA'S CRITICISMS OF KOCH'S METHOD OF TREATING TUBERCULOSIS.

To the Editor of the THERAPEUTIC GAZETTE:

DEAR SIR:—In the March number of the THERAPEUTIC GAZETTE appears a translation of Professor Semmola's article from the *Internationale Klinische Rundschau*, purporting to be "A Critical Study of Koch's Cure for Tuberculosis."

The writer of that paper, upon much theoretical reasoning, without any personal observations and without recognizing any of the clinical results obtained, concludes that it is simply impossible for tuberculosis to be cured by Professor Koch's lymph, but expresses his willingness to take back all he has said when he sees the first case of a real cure from the employment of the remedy.

The question even then would arise as to what is a real cure of tuberculosis, and for how long a time must the apparent cure have lasted to make it real? If time is at all required after the disappearance of symptoms, and if, as I should believe, such time should be at least six or twelve months, then his adverse conclusions are entirely premature; for he wrote only three months after the first employment of the remedy, when not even an apparent cure should have been expected from the first trials of any remedy were it ever so valuable or specific, for he himself claims that in our previous experience many months or years had to elapse in climatic and other treatment to accomplish this, and even then experience has shown that the cure may be only apparent, and relapse follow thereafter.

I consider that a real cure of any disease is accomplished when the symptoms have disappeared and the patient has returned to a condition of previous health, but that evidences of the previous disease may remain in the parts or organs having been the seat of structural changes, the cure being nevertheless real.

In tuberculosis, especially of internal organs, it is, however, difficult to say that every tubercle nodule or bacillus has undergone expulsion, or such changes that further pathological processes will not recur, and we have, therefore, not been willing to consider such a case permanently cured until time shall have shown such permanency. If it prove permanent, *the permanency was already established at the time when the cure was only apparent*, and when the last symptom and sign had disappeared.

It is, therefore, not necessary at the present time to show permanent or real cures, we have not had time for the proof of permanency.

In estimating the value of a remedy in a disease which the writer says takes years to apparently cure, even an undoubted improvement, distinctly referable to the remedy in so short a time as three months, should be received gratefully by both profession and patients. If this writer, a year hence, is willing to take back all he has said in adverse criticism, based upon *a priori* reasoning, or at a time when he can be convinced of a permanent or real cure of a single case, it seems strange that he *cannot* at the present time withhold adverse criticism, when, in the very nature of things, time for permanency has not arrived: and when a great number of not only real improvements, but also of apparent cures are already accomplished, which stand in as good a relation of cause and effect to the remedy of Koch as do any other of our therapeutic resources to the diseases for which we have hitherto employed them.

Such criticism is more unjust, misleading, and unscientific, as are heralded reports of cures of cases, perhaps only apparently cured, or possibly only materially improved, and I protest against insinuations made against the judgment of the very foremost of our clinicians all over the world, who do say that they have seen improvement and apparent cures from the employment of this agent. Further, I should be more generously inclined towards the latter, should they all have failed to observe correctly (for the burning desire to get real help in our battle with a hitherto almost unconquerable foe would have been father to the thought), than I would towards the critic, who, without weighing the evidence presented, and prematurely, without having used it, decries a valuable remedy, and by so doing produces suspicion and fear in the minds of those who have had no personal experience.

At the present no one should pass judgment

on Koch's method. Every one of the profession who at all ventures upon its use must do so with the knowledge that it is not an indifferent agent, and may produce the gravest consequences as well as the most happy results.

How to avoid its dangers must be our task for some time to come, and I have already pointed out one source, which I believe to have been overdosage, or too rapid increase in dosage, especially in pulmonary cases. Under a much more conservative use, I have, after three months, no regret to record of its employment in any case, and even in advanced cases I have been able to use the remedy apparently with the happiest results. We have at this writing six cases in which an undoubted arrestment of both subjective and objective symptoms of the local processes is manifest, and which may now be claimed as apparently cured, the general health having also been restored. In two early cases of laryngeal tuberculosis nothing subjective or objective is discernible that would even justify a suspicion of disease.

Even in advanced disease we have ten cases of remarkable improvement of both subjective and objective symptoms, with gain in flesh up to seventeen pounds in two months; and there is now not a single case on this method of treatment in my institution where there is no change for the better. Certainly, if all this improvement is incidental, it must be conceded that the remedy has not retarded it, and I have injected as high as fifty milligrammes, one milligramme of which our critic says is dangerously poisonous.

Even my latest case admitted to this treatment for a sufficient length of time to expect any results should convince our critic that his position is unwarrantable by clinical facts, and I report it here at length as the least of the benefits conferred by this remedy in my hands, but highly satisfactory considering the nature and extent of the affection, and the short time the treatment has been employed.

Mr. P. has suffered from his pulmonary affection for five years, and has lived in this climate on account thereof during this time. His decline has been very gradual, and he has consulted me several times during the last six months, when the physical symptoms present were each time carefully recorded. A record in October last, another on the 29th of December, and again another, February 28, showed the following condition without any material change from one time to the next. A dry cavity in right upper lobe to third rib in front and middle of scapula posterior, dense infiltration to fifth rib in front, and less marked in lower lobe anteriorly, posterior, and lateral. In all the right half of the chest numerous moist râles mask every respiratory sound, both in inspiration and expiration. On the left side there is a cavity, anterior to second rib, with gurgling; infiltration exists anterior and posterior to a level of nipple and lower angle of scapula, respectively, with the same condition of moist râles as noted on right side. Sputum contained tubercle bacilli. On the 29th of December I refused this patient for Koch's method of treatment, but owing to some good results in other advanced cases, I consented to a trial, February 28, and he received his first injection of one-half milligramme on March 2. Since that time an injection every third day, the last one of .0015; in all not more than .01 of the lymph has been used, and yet after the second injection of .0005 the patient himself was sensible of its effects by increased cough and expectoration and various other sensations, while unmistakable changes in the lung occurred since, which to-day enable me to show absence of all râles in both lungs, and disappearance of gurgling in the cavity on the left side, and which is now entirely dry. Only upon a very quick and deep inspiration can I hear at its end a few small moist râles anterior in the right side immediately below the cavity. The respiratory sounds are now distinctly audible and distinguishable in their character.

In the mean while his appetite has improved, he has made a slight gain in weight, is less short of breath, the expectoration is greatly diminished, as is also the cough, and he sleeps on that account uninterruptedly all night. The bacilli seem also less in his sputum, which is more mucous and less purulent in character. His life and external conditions have in no wise been changed beyond his change from his own comfortable and commodious residence to my institution.

Is this now all chance and accident? Why has not this occurred before under most painstaking care and management, and under the continuous influence of the same favorable climate?

This terrible poison of which our critic would warn us of has certainly done no harm, and under its use, of which the patient experienced sensible but no distressing effects, a train of symptoms has subsided which

have endeavored to improve for six months past without having, in any way, been successful.

But, apart from this case, I now have a number of apparent cures, and a large number of radical improvements, which, to me and also to the particular patients, are very acceptable indeed, and which I should have welcomed as readily and gladly had they followed any other method of treatment, or to medication with inorganic substances. Our critic knows as little of their prospective relapses as I know of their permanency. Only I believe that I have common sense and reason on my side, when I accept them for what they are, with the hope and confidence that the remedy which has aided me in bringing them about, will also aid me in preventing relapses in the future, and making the cases of improvement as permanent as possible.

I know very well that many cases may even fall short of apparent cures or much improvement. First, because of their particular constitution and recuperative powers and advanced stage, that will be impossible, but also because the remedy will have been used with less care and discrimination, and without the additional aids which we fortunately possess in climate and general control of our patients. How far the latter may have contributed in our results we, of course, cannot say.

In the mean while we can only thank Professor Koch for what he has given us as an additional means to overcome a disease which, in its fatalities, outnumbers any other known; and we can be thankful even if the great expectations that have attended its advent have not been and never will be realized.

It has in my hands done all that Professor Koch has claimed or suggested it may accomplish; yes, even more; and while honest criticism should ever be welcome in preserving us from error, unwarrantable denunciations are more injurious to the cause than the pardonable enthusiasm which led some to expect too much.

Respectfully yours,

KARL VON RUCK, M.D.

WINYAH SANITARIUM,
ASHEVILLE, N. C., March 20, 1891.

AT IT AGAIN!

To the Editor of the THERAPEUTIC GAZETTE:

DEAR SIR:—I have recently received a copy of a pamphlet issued some time ago by Miss Frances Power Cobbe and Mr. Benjamin Bryan. It is entitled "Vivisection in America," and is in many ways an astonishing publication. I shall at present comment only on the part of it which refers to some experiments made by Dr. Hartwell and myself in the year 1879.

The good faith of Miss Cobbe I do not doubt, though I cannot but realize that zeal without knowledge is a dangerous thing even in so clever a woman. As regards Mr. Bryan the case is different. It became my duty some years ago to publicly convict him of deliberate falsehood. I find it my duty to once more undertake the same unpleasant task.

Mr. Benjamin Bryan has been frequently informed that when the chest cavity of a mammal is opened artificial respiration is necessary in order that life be maintained. A mammal with opened chest cannot breathe for itself, curare or no curare. A first-year medical student could tell Mr. Bryan that fact, and it is impossible to believe that Mr. Bryan is not well acquainted with it. Nevertheless, he continues to assert that whenever artificial respiration has been used in an experiment the animal must have been curarized; and he is rash enough to make this assertion in regard to the animals on which Dr. Hartwell and I worked.

The research to which he refers was one necessitating the natural action of the nerves of breathing on the muscles of breathing. Those nerves thrown out of action, the experiment would have been impossible, and any employment of curare (which paralyzes the motor nerves) was quite out of the question. Moreover, any writhings of an animal suffering pain would have made the research impossible.

But what does Mr. Secretary Bryan assert?

"This [referring to the statement that artificial respiration was used] implies the administration of curare, which would render the ether useless and needless for keeping the animal quiet for a short time."

Truly, he earns his wages! But would he not be wise to share them with a person who has some knowledge of physiology, if perchance he could find such a one willing to bargain with him. An arrangement of that kind

> "Wad fra monie a blunder free him,
> And foolish notion."

H. NEWELL MARTIN.

JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

ARISTOL—A PATENT MEDICINE.

To the Editor of the THERAPEUTIC GAZETTE:

DEAR SIR:—The wide distribution of a printed circular by Messrs. Schieffelin & Co., of New York, and Mr. E. N. Dickerson, in which attention is called to the fact that any one in this country will be prosecuted who sells or uses "aristol" not purchased from Messrs. Schieffelin & Co., or who manufacture this compound of thymol and iodine by any process whatever, is a sad commentary on our patent laws which render such doings possible.

Within the last year or two, chiefly through the investigations of Professor Ranke, ("Ueber die antiseptische Wirksamkeit des Thymols-Gasverbands, nach Versuchen in der Gröninger Klinik"), thymol has been proved to be superior to phenol as an antiseptic (see also Nothnagel and Rossbach, Arzneimittellehre).

Aristol is a compound of thymol with iodine, and has been lately brought to the attention of medical men. Patents have been granted by the United States Patent-Office for the control, manufacture, and sale of the article under that name.

No one familiar with the patent laws will wonder at the action of the patent office in granting one more application of this nature.

Chemists, however, are beginning to wonder if all the information embodied in text-books will not be the basis of a series of patents in the near future, providing that the matter be designated by new and euphonious names.

False sentiment for industrial enterprise is out of place. The majority of medicinal patents have no real merit. Most of them represent absolutely nothing that was previously unknown to science; they are nuisances; they do not contribute to the general intellectual progress; they discourage scientific investigations, instead of promoting its stimulating and life-giving properties.

For example, would it not be a crying injustice if chemists, by law, should be prevented from making chloroform or iodoform, substances known over fifty years, according to methods that are laid down in text-books of chemistry, merely because some one had his attention attracted by what people call a formula, and applied for and obtained a patent on a variation of a method of making those articles?

The only explanation that can be given of this lamentable state of affairs lies in the laxity and ambiguity of the present patent laws, and the almost puerile knowledge which they manifest regarding history of chemistry in its broadest sense. A medicinal preparation need not represent anything novel further than the new name; no scientific principle or discovery need be involved. They are patented only for the money that may be made out of them as common ventures; no benefit to science or humanity is intended. Those patentees are good judges of human character!

The genius of the chemical profession as laid down in Poggendorff's and Liebig's "Annalen der Chemie und Pharmacie," offers valuable "germs" for inventions, discoveries, and "patents."

If I am not entirely misinformed, it was known to the medical world that aniline compounds lowered the temperature of the body. Now we are annoyed with a patented preparation of an aniline compound (acetanilide, antifebrin).

Pyoktanin is only a fancy name for a well-known aniline color, the clearly-defined properties of which every microscopist was well aware.

Saccharin was an original discovery. So was artificial indigo, and was artificial vanillin. The promoters of such progress deserve encouragement, and should enjoy financial benefit from their inventions.

But, as stated, thymol was known before aristol was patented.

Aristol is merely an assumed name for dithymoldiiodine, and it is theoretically prepared by adding a thymol solution to an iodine solution (Schmidt, "Lehrb. d. Pharm. Chemie, 1889–90, p. 1502). Aristol, ignoring the deceitful expression of its advocates, the "preparation involves the greatest care and experience;" 1° must give the iodine reactions (a part of it heated in a test-tube will, if genuine, give off the characteristic violet vapors of iodine). This is, however, no warrant that it is a pure article, as it may contain free iodine; 2° must give thymol reactions (dissolve a mere trace in a few c.c. glacial acet. acid; add a few drops of concentrated sulphuric acid and one drop nitric acid.) A beautiful dichroistic fluid is obtained, red by transmitted, dark green by reflected, light, if thymol is present.

Impurities in aristol would be all the by-products, derived from unskilful treatment; it might contain potassium or sodium iodide; free iodine, as stated; it might be adulterated even, for, as a patented article, it is above control.

I would sooner prefer the application of a pure solution of a well-defined, legitimate chemical compound than one upon which no control can be exercised.

But let us look at it under another light. We have a great many much more difficult names to remember than thymol-iodine would be,—mercury iodide, mercurous chloride, sod. hypophosphite, etc. And, as we have intimated above, thymol-iodine is a definite chemical body, capable of control as to purity when brought on the market. Thymol costs at present four dollars a pound; for aristol is charged two dollars an ounce. It is a matter of record that impurities have been found in the aristol now being sold by the patentee.

Why could not the physician call our pharmaceutical preparations by their legitimate names if he wants thymol iodine? If he wants to try the use of it instead of iodoform, why not say so, rather than pander to the debasing tendency towards quackery by indorsing "aristol" upon his prescriptions, of which he knows nothing?

It is the *laisser aller* system that is at the bottom of all these patent or patented medicines. We, analysts, must get acquainted with microscopical research and physiological experiments. Poisoning cases may call for spectroscopical investigations even, at any time; this is not the place to dwell upon this subject. If the physician would take a little trouble and get a better insight into the chemical identity of the new articles he wants to prescribe, the ethics of medicine and pharmacy would be largely benefited.

J. B. NAGELVOORT, PH.G.

DETROIT, April 27, 1891.

NEW YORK, 16th April, 1891.

ROBERT MEADE SMITH, ESQ.,
EDITOR THERAPEUTIC GAZETTE,
322 SOUTH TWENTY-FIRST STREET,
PHILADELPHIA, PA.:

SIR:—I desire to call your attention to letters patent of the United States granted to Josef Messinger & Georg Vortmann (assignors to Edward N. Dickerson), February 24, 1891, No. 446,875, for the substance now commercially known as "aristol," which is a compound of iodine and thymol.

Messrs. Wm. H. Schieffelin & Co. are the exclusive agents for this product in the United States, and I warn all parties against dealing in that substance unless purchased from them.

It is also illegal and an infringement of said patent to manufacture said substance in any way whatever in the United States.

I am the owner of the patent, and will promptly prosecute all infringements brought to my attention.

I desire, likewise, especially to call your attention, as editor of the THERAPEUTIC GAZETTE, to an article published by you on *October 15, 1890*, at page 18 of your GAZETTE, in which you describe a method of making aristol. As above stated, I own the patent for this combination, and trust, therefore, that you will refrain from using your influence in leading practitioners to infringe this patent to their own detriment.

I shall be obliged to you for inserting a statement of the facts in your GAZETTE.

Yours truly,

E. N. DICKERSON.

[Things have come to a pretty pass when hitherto reputable drug-houses not only take up the manufacturing of proprietary medicines, but even attempt to suppress information as to their nature. It is the existence of this mercenary spirit in the drug trade, which inspired the above letter, that keeps the druggist on a par with other shop keepers with whom money-making is the only thought. It is high time that the medical profession should take some action in this matter: its nature and direction are self-evident, for a manufacturing druggist who thus acknowledges money-making as his only principle may be expected to live up to this principle in the manufacture of his pharmaceutical preparations so as to leave the widest margin of profit.

Fortunately, the virtues of aristol and its alleged advantages over iodoform, chrysarobin, etc., are not so pronounced as to cause any hesitation in relegating it to the class of patent medicines, where its mode of introduction and manipulation by Messrs. Schieffelin & Co. entitle it to a place.—ED.]

Notes and Queries.

CONGRESS OF AMERICAN PHYSICIANS AND SURGEONS.

The meetings of the Congress of American Physicians and Surgeons will be held in Washington, from 3 to 6 P.M., September 22, 23, 24, and 25, 1891.

WILLIAM PEPPER,
Chairman of the Executive Committee.

PARKIN PRIZE ESSAY BEQUEST.

In the terms of the bequest made to the Royal College of Physicians of Edinburgh by the late DR. JOHN PARKIN, Fellow of the College, a prize is hereby offered for the best essay "On the Curative Effects of Carbonic Acid Gas or other Forms of Carbon in Cholera, the Different Forms of Fever, and other Diseases."

The prize is of the value of one hundred pounds sterling, and is open to competitors of all nations.

Essays intended for competition, which must be written in the English language, to be received by the secretary not later than 31st December, 1892. Each essay must bear a motto, and be accompanied by a sealed envelope, bearing the same motto outside and the author's name inside.

The successful candidate must publish his essay at his own expense, and present a printed copy of it to the college within the space of three months after the adjudication of the prize.

In name and by authority of the council of the college.

G. A. GIBSON, M.D.,
Secretary.

9th March, 1891.

THE INFLUENCE OF EXERCISE ON DIGESTION.

DR. STRENG, in a lecture before the Medical Society of Giessen on the "Influence of Exercise on Digestion," which has been published in the *Deutsche Medicinische Wochenschrift*, states that he concludes from his own experiments that this influence is of a retarding nature. His experiments, however, suffer from the fact that he always injected three hundred cubic centimetres of water before obtaining the contents of the stomach, so that the proportion between gastric juice and water continually varied. The first experiments in the clinic at Giessen were made on two dogs. Twenty-five grammes of meat, suspended in three hundred cubic centimetres of warm water, were twice injected into the fasting stomach, and after one feeding the dogs were compelled to remain for three hours in absolute bodily rest, while after the other feeding they were made to take active exercise. After the three hours the contents of the stomach were obtained and analyzed. The quantity did not essentially differ in the two cases; the experiments consequently tended to prove that exercise does not influence the time required for digestion. The chemical analysis also detected no difference. The same results were obtained by substituting the white of an egg for the meat. The experiments were then repeated twenty-five times on three men with healthy stomachs. Two of these suffered from sycosis, and the third from incipient muscular atrophy. They were fed each time with two hundred grammes of minced meat, a bun, a plate of bouillon, and three spoonfuls of mashed potatoes, and the contents of their stomachs were obtained four hours and a half afterwards. The exercise after meals consisted partly in gymnastics, partly in walking; absolute rest was obtained in bed. These experiments gave the same results as those on the dogs, the difference resulting from the chemical analysis being especially imperceptible. The author, therefore, concludes that the gastric function is in no way influenced either by muscular action or by absolute rest.—*Lancet*, March 7, 1891.

REDDENING OF CARBOLIC ACID.

The cause of the intense red coloration frequently observable in carbolic acid after storage for a short period has been the subject of much patient investigation in continental pharmaceutical circles during the last decade. The ill-success that has attended many of these researches is no doubt due to the small quantity of impurity or impurities necessary for the production of a visible effect, so that the absolute conditions under which reddening occurs have been recognized by a few observers only, and the nature of the chemical changes involved is still a matter of uncertainty. The first general impression that the reddening of carbolic acid is a sign of insufficient purity has been removed by the observation that this property is also possessed by synthetic phenol, concerning which there can be no question of contamination with tarry products. Moreover, it has not been shown that the reddened phenol has deteriorated in medicinal value; but the preference for a colorless preparation is only natural, and is expressed as a demand in the new German Pharmacopœia. Hager first stated that a red coloration can be produced in carbolic acid by ammonium nitrite, and later Finzelberg, Meyenbeck, Fabini, and

thers attributed the same effect to the action f several heavy metals, notably that of cop- er. These latter observations are in accord ith the fact that pure carbolic acid shows ss tendency to redden when not stored in ietallic cases. E. FABINI, in a series of arti- les in the *Pharmaceutische Post* (January, pp. , 25, 41, 61), now claims to have isolated the ed coloring-matter in an approximately pure tate, and to have determined the exact con- itions of its formation. He further indicates ie probable courses of the reactions involved i the synthesis of the dye, but this suggestion iust be substituted by further data before it an be seriously considered. By further study f the action of copper on carbolic acid, Fabini ound that the coloring material was formed iost rapidly by digestion of cupric sulphate, istead of the metal, with the ammonium salt f carbolic acid. Prepared by this method nd extracted with ether the dye proved to e a black, odorless, and tasteless resinoid ody, that sublimes upon heating, gives a haracteristic blue coloration with concen- ated sulphuric acid, and yields a residue in hich no trace of copper can be detected. t dissolves in alcohol with a red-brown, in ther with yellow, and in chloroform with ellowish-red color, and even in the pro- ortion of 1 to 300,000 produces a beau- ful red color in carbolic acid. He sug- ests that copper enters the phenol molecule ith simultaneous elimination of water, ac- ording to the equation $Cu + 2C_6H_5OH = (C_6H_5)_2CuO + H_2O$, and that the phenyl cop- er oxide so formed is reduced by further henol molecules to copper and an oxidation roduct of carbolic acid, which he does not retend to identify. The process repeats self, and is thus one of continual oxidation. n support of this theory, he states that, though trace of copper will produce a large quan- ty of dye, carbolic acid, completely freed om all traces of metals, does not redden, or is the coloration produced so long as an xidation agent, like hydrogen peroxide, is resent. The presence of ammonia, or rather ie ammonium salt of phenol, appears to be lso necessary to the formation of the dye, nd some connection apparently exists be- ween the ready absorption of ammonia from ie atmosphere by carbolic acid, the liquid ature of the ammonium salt and the occur- ence of the red coloration in the liquefied ortion of the carbolic acid. If copper and mmonia be present in the carbolic acid, the ccess of air does not appear to affect the re- lt, since, according to Fabini, the phenol can supply by its own oxygen for the oxida- tion process. The remedy appears to be the total prevention of contact with metals during the process of manufacture and storage.—*Pharmaceutical Journal and Transactions*, Feb- ruary 28, 1891.

A NEW HYPNOTIC MIXTURE.

In the *Journal de Médecine de Paris* for March 22, 1891, DR. STEFANI calls attention to a new hypnotic, which, even if it be not very efficacious, at any rate has the merit of being perfectly harmless. This mixture con- sists of equal parts of tartaric acid and sodium bicarbonate, the sodium bicarbonate being dis- solved in water, the tartaric acid then added, and the mixture drunk while effervescing, from ½ to 2 drachms being given at bed- time. It does not seem probable that, strictly speaking, this mixture, which differs from a Seidlitz powder only in the relative properties of the ingredients, can have any hypnotic power whatever, although perhaps, as Stefani claims, carbonic acid may be endowed with some slight hypnotic power.

CREOSOTE IN DIABETES MELLITUS.

According to VALENTINI (*Les Nouveaux Remèdes*, March 8, 1891) creosote adminis- tered internally may be of considerable ser- vice in the treatment of diabetes mellitus. The author reports two cases, in which at first 4 drops of creosote were given daily, and the quantity then gradually increased to ten drops in twenty-four hours. Under the influence of his remedy it is claimed that the sugar disappeared, and did not return even after the patients had again commenced to use starchy food.

UROBILINURIA CAUSED BY TUBERCULIN.

DR. G. CAVALLERO reports (*Gazetta Medica di Torino*, February 5, 1891) the occurrence of urobilinuria in three cases treated by Koch's method in the clinic of Professor Forlanini at Turin. Urobilin, with traces of albumen in two of the cases, was found in the urine during the fever of reaction; in one of them these substances appeared at the time when reaction was due after an injection, though no other reactive phenomena were observed. Urobilinuria persisted, though only to a very slight extent, on the day following the injec- tion. Cavallero thinks the excretion of uro-

bilin is an effect of an alteration of the liver, similar to that observed by Hayem in the course of acute infective diseases, and by him attributed to the passage through that organ of toxic substances circulating in the blood during such disorders. The hæmoglobin in the blood is transformed into urobilin, as happens in malarial infection, according to Mya. Tuberculin, therefore, acts like an acute infective fever, producing changes in the liver (degeneration of the hepatic cells?) and in the red corpuscles.—*British Medical Journal*, March 7, 1891.

CHICAGO PASTEUR INSTITUTE.

According to the second report of the Chicago Pasteur Institute for the Preventive Treatment of Hydrophobia since the opening of the Chicago Pasteur Institute (July 2, 1890), 55 persons have received treatment.

31 came from Illinois, 10 from Iowa, 4 from Indiana, 2 from Ohio, 2 from Minnesota, 1 from Missouri, 1 from Tennessee, 2 from Kentucky, 1 from South Dakota, 1 from Arizona.

36 were male and 19 female.

The youngest patient was 2½ years old and the oldest 56. 51 were bitten by dogs, 3 by cats, and 1 by a skunk.

31 persons were bitten in the hands and arms, 3 in the face, and 20 in the body and legs. 24 had their wounds cauterized with chemical agents, and 31 had not.

33 persons were bitten by animals recognized and ascertained of being rabid, by experiments made upon rabbits, by the death of persons and other animals bitten by the same, or by symptoms shown during life, and 22 persons were bitten by animals strongly suspected of being rabid.

All the persons treated are now enjoying good health.

Adhering to the principles of strict and careful sterilization of all instruments and fluids used, no abscesses nor inflammations, nor even irritation of any kind, occurred at the seat of inoculations, thus testing the *purity* of the material used.

It has been made a practice at this institute never to submit persons to treatment *unless in need of it.* Consequently 96 persons were refused treatment, as not reasonable evidence was produced to demonstrate the madness of the animals. All these persons are also in good health, confirming the correctness of our judgment.

EXPERIMENTS TO DETERMINE THE CENTRE OF RESPIRATION.

Dr. Laborde communicates to the *Comptes Rendus de la Société de Biologie* the results of experiments made by him to ascertain the nerve-centre for respiration, promising a larger work at some future time. He found that superficial mechanical injury to the region of the alæ cinereæ does not accelerate respiration; a deep puncture decreases, or even temporarily arrests, respiration; if the injury penetrates at least to the middle of the substance, respiration may cease altogether. This result is always obtained if a certain circumscribed portion of the substance is cauterized with the hot iron. This portion need in the rabbit be only half a millimetre in diameter, in the dog from one to two millimetres. The iron must, however, enter immediately above the apex calami, and must penetrate at least half the substance from the raphe. If the injury is unilateral, respiration may continue for some little time on the opposite side. Total separation of the medulla below the apex calami always arrests respiration of the trunk, while that of the head continues for some time. Spinal reflexes continue, and even increase; irregular superficial contractions of the respiratory muscles, leading to no results, may be observed. The increase of the reflex action is especially remarkable in new-born animals. No parts of the brain above the medulla oblongata, including the cortex, the corpora quadrigemina, and thalami optici, have any specific influence whatever on the respiratory muscles.—*Lancet*, March 7, 1891.

INFLUENCE OF COLORING-MATTER OF WINE ON DIGESTION.

Dr. Hugounenq has made a number of experiments with artificial digestive fluids, which have led him to formulate the following conclusions (*Répertoire de Pharmacie*, April 10, 1891):

1. All wines without exception interfere with the action of pepsin. Those which are most highly charged with coloring-matter, with alcohol and cream of tartar, are the most hurtful.

2. The acidity of new wines is incapable of aiding the action of pepsin.

3. Among the coloring-matters artificially and fraudulently introduced into wines, methylin blue, azoflavine, and, above all, fuchsine interfere with peptic digestion; while the vegetable coloring-matters, such as black

mallow, elder, and œnoline also exercise unfavorable action.

4. In removing a part of the cream of tartar plaster removes from wine an element which tends to slow the action of pepsin. Digestion is more rapid, therefore, with plastered wines than with natural wines.

ESSENCE OF CINNAMON IN MALARIA.

DR. CAPSUS states in *La Pratique Médicale* for April 7, 1891, that in the hospital in Marguelane, in Turkistan, excellent results have been obtained in the treatment of all forms of malaria by sprays of the essence of cinnamon. Even cases which have resisted the action of quinine and arsenic improved in a few days under this treatment. The spraying is performed several times daily in the hospital wards, and is stated to be much more efficacious than a similar procedure with the essence of eucalyptus.

DANGERS OF SULPHONAL.

Although sulphonal is probably one of the safest, as it is one of the most efficacious, among the hypnotics recently introduced, the series of cases published by BRESSLAUER, of Vienna, show clearly that it has certain dangers. The degree of peril is difficult to estimate, as the patients were lunatics, and were also apparently feeble; but the fact is significant that out of seventy-seven patients who were treated with the drug, no less than seven showed serious symptoms, and in five of these there was a fatal termination. It ought to be mentioned that the patients had been taking the drug for a considerable time in good doses, and had borne it well until symptoms of disturbance set in, these being great constipation, dark-brown urine, slow, or in some cases rapid but feeble pulse, discolored patches resembling purpura on the limbs, and great prostration. In the cases which ended fatally, the cause of death was heart-failure, with œdema of the lungs.—*Lancet*, April 4, 1891.

CHLORAL AS A COAGULANT.

Though hydrate of chloral is generally used in medicine, it is not without its advantages in surgery. According to DR. MARCSÉE it possesses the property of coagulating blood and serous fluids, and may be made to replace the iodine solution generally injected into hydroceles. He himself has treated two hundred hydroceles with chloral without the occurrence of any accident. He employs for this purpose a ten per cent. solution, an ounce of which is injected all at once, or very slowly, into the sac. Two or three days afterwards a large effusion of fluid into the tunica takes place, but is soon entirely reabsorbed. Where the hydrocele wall is much thickened, injections of chloral, or, indeed, of any kind, are useless, and recourse must be had to free incision. The chloral solution above referred to may be repeatedly injected, with advantage, into the neighborhood of varicose veins, as it causes the blood gradually to coagulate, and the veins to contract. Some trials have also been made with chloral as an injection into vascular tumors, but hardly sufficient to warrant any definite report.—*Lancet*, February 14, 1891.

THE DANGERS OF CALOMEL IN CONJUNCTIVITIS.

DR. PIEDALLU reports, in the *Lyon Médicale* for March 29, 1891, that one of his patients having accidentally introduced some ipecac into the eye, and this being followed by suppuration and a large ulceration of the cornea, he instituted an antiseptic treatment, which was completed by the introduction of a pinch of calomel, with an equal part of powdered milk-sugar. After about fifteen minutes the patient complained of intolerable suffering. There was great swelling of the eyelids, with protrusion of the conjunctiva. On making inquiry, Dr. Piedallu learned that his patient for the last six months had taken from fifteen to thirty grains of potassium iodide daily, and analysis of the tears showed that they contained large quantities of iodine. A violent caustic combination was, therefore, evidently formed between the calomel and the iodine, with the most disastrous effects, for although the eye was not completely destroyed, vision was almost totally lost. This unfortunate accident is well worthy of attention, so that the repetition of such an unfortunate state of affairs might be avoided. Before calomel is introduced into the eye, inquiry should first be made as to whether the patient has been on iodine treatment.

A CORRECTION.

In the article published in the April GAZETTE, by Drs. Gibbes and Shurley, reference is made on page 221 to an emulsion of "oil of eulicum." This is a typographical error. It should be eulachon oil.

—THE—

Therapeutic Gazette.

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*A PHYSIOLOGICAL AND THERAPEUTIC STUDY OF HYDRASTIS CANADENSIS.**

By David Cerna, M.D., Ph.D.,† Philadelphia, Pa.

(Continued from page 305.)

CLINICAL EVIDENCE.

IMPERFECT as is the knowledge of the physiological action of *Hydrastis Canadensis*, the fact is not to be wondered at that the use of the drug in the treatment of disease has rested chiefly on empiricism; but the time will come, no doubt, when this will be substituted by the rational use of the remedy, and, there is reason to hope, with more satisfactory results.

For many years the plant has been employed extensively, especially in this country in the treatment of various acute and chronic affections, and the results obtained, if we are to believe the statements made by many reliable practitioners, have been thus far satisfactory.

Without entering very largely into a discussion of the early medical history of *Hydrastis Canadensis*, I may state that, as far back as 1798, Barton,‡ speaking of cancer, says

* An essay to which the Prize, for 1890, was awarded by the Medical Society of the County of New York.

† Assistant in Physiology in the University of Pennsylvania.

‡ "Collections for an Essay towards a Materia Medica of the United States," Part I., p. 9; Part III. of the same, pp. 13 and 14.

'I am informed that the Cherokee cure it vith a plant, which is thought to be *Hydrastis Canadensis*, and that the root of the plant s a very powerful bitter." And again, later, n 1804, that "the hydrastis is a popular remdy in some parts of the United States. A pirituous infusion of the root is employed as tonic bitter in the western parts of Pennsylrania, etc., and there can be no doubt that oth in this and other shapes our medicine nay be used with much advantage. An inusion of the root in cold water is also emloyed as a wash in inflammation of the yes."

Rafinesque* speaks of the plant as being mployed by the Indians in sore legs and nany external complaints, as a local tonic, nd internally in the form of infusion or incture in disorders of the stomach, the iver, etc., and also as a diuretic, stimulant, nd escharotic.

Howard† recommends golden seal in dysepsia; and Beach‡ states that it has tonic roperties, being, besides, "a laxative, which nakes it very appropriate in dyspeptic disrders."

Hydrastine has been found§ to be of great ervice in bowel complaints of children; useul also as a corrector of the stomach, regutor of the bowels, and as a vermifuge. It as especially of great benefit in the morning ickness attending females during pregnancy, elieving stomachic oppression, nausea, and eart-burn.

Lewis‖ refers to the drug as an excellent emedy in ophthalmia.

Sanborn¶ mentions it as being used by the ndians as a diuretic.

Kost** recommends it in the form of infuon in inflammation of the mucous memranes, and of value in erysipelas. Dunglion†† affirms that wounds were treated in Kentucky by the topical application of ydrastis.

Physicians of all denominations have spoken n glowing terms of the therapeutic value of his important drug.

The followers of Hahnemann have used it fficaciously (?) in most diseases of the mucous membranes, such as the different kinds of conjunctivitis, otorrhœa, affections of the Eustachian tubes, catarrh of the nasal passages, of the pharynx, the fauces, the stomach, the intestines, the gall-duct, the urethra, the vagina, the uterus, etc. In such cases the drug has been applied in the form of the tincture or as the muriate of hydrastine. They have also employed it with asserted favorable results in disorders of the skin, such as lupus, psoriasis, excoriations, ulcers, boils, and even variola. They likewise speak highly of its use in disorders of the gastro-intestinal mucous membrane, and as a general tonic they consider it superior to cinchona and its alkaloids.

With regard to the homœopathic therapeutic virtues attributed to hydrastis, I can refer the reader to an article by Hale.‡‡

The eclectics have found golden seal of decided value also as a tonic and in diseases of the whole alimentary tract. They affirm to have observed excellent results in stomatitis with increased secretion; in acute and chronic pharyngitis, in catarrhal gastritis, in catarrhal dyspepsia, in many affections of the bowels, and even in ulcerations of the rectum. It has also been employed by them, with apparent advantage, in nasal catarrh, in nearly all stages of gonorrhœa, in acute and chronic affections of the conjunctiva, in many cases of diseased cervix uteri and of cervical metritis with profuse secretions from the cervical canal. It is, perhaps, needless to say that in such cases the application of the drug has been local. With regard to the eclectic medical literature of hydrastis, I have again to refer the reader to two articles by Drs. Scudder and King,§§ and to the reports of Professor Z. Freeman on clinical lectures by Professor Newton.‖‖

But, leaving the homœopaths and the eclectics commendably, perhaps, in peace, I will especially confine myself, with regard to the therapeutic uses of hydrastis, to study the literature of the old, regular school.

Professor Bartholow¶¶ states that hydrastis is an excellent stomachic tonic, and therefore useful in atonic dyspepsia and in the extreme debility arising from acute diseases; that

* "Medical Flora," vol. i. pp. 253, 254.
† "Improved System of Botanic Medicine," 1832, 327.
‡ "American Practice of Medicine," 1833.
§ *Thomsonian Recorder*, 1833, p. 398.
‖ *American Journal of Pharmacy*, 1834, p. 201.
¶ "Medical Botany," 1835, p. 63.
** "Elements of Materia Medica and Therapeutics."
†† "Medical Dictionary," ed. 1852, p. 450.
‡‡ Lloyd's "Drugs and Medicines of North America," vol. i. p. 161.
§§ *Ibid.*, 1884–85, vol. i. pp. 169, 170.
‖‖ *Eclectic Medical Journal*, 3d series, vol. ii., 1854.
¶¶ "Materia Medica and Therapeutics," 5th edition, 1887, article on "Hydrastis"; also Lloyd's "Drugs and Medicines of North America," 1884–85, vol. i. p. 159.

beneficial effects are observed in cases of catarrh of the stomach, accompanied with fermentative changes in certain foods, whether or no the sarcina ventriculi be present; that it is of decided value in the gastro-duodenal catarrh of chronic alcoholism, being of special utility in the treatment of duodenal catarrh, when accompanied with catarrh of the gall-ducts and jaundice; and that benefit accrues from the use of the drug in that catarrhal state of the cystic duct that leads to inspissation of the bile and crystallization of the cholesterin. In such cases the preparations employed have been the tincture and the fluid extract in doses of from 5 to 15 drops of either thrice daily before meals.

The same writer has also tried hydrastine in several cases as an antipyretic and antiperiodic, but apparently with little success. In two cases of intermittent fever, of recent nature, he gave each 20 grains of the alkaloid (Professor Wayne's, of Cincinnati), in three doses, in anticipation of the seizure. The result of the first attempt was a modification of the violence of the attack, but this was not prevented in either case. In the second attempt the results were successful. Three other cases of a chronic character required as high as 60, 65, and 80 grains respectively; and in two others, still more rebellious, the drug failed to operate, the patients became uneasy, and quinine had to be resorted to finally. He thus concludes that hydrastine, as a remedy for ague, ranks below the cinchona alkaloid.

Bartholow also speaks highly of the beneficial results obtained from the local application of the fluid extract of hydrastis in diseases such as stomatitis, both mercurial and aphthous, gonorrhœa, after the acute stage has subsided, and gleet, especially in the latter affection. He has seen no injections so frequently successful in gonorrhœa as hydrastine itself or the fluid extract of the plant. He likewise recommends it as a useful medicine in spermatorrhœa, prostatorrhœa, urethral, vaginal, and uterine catarrh, ulcerations and erosions of the cervix uteri, chancroids, unhealthy and sloughing sores, and in old ulcers of the leg.

Payne* has treated with success two cases of cancer,—one of the breast and another of the rectum. He found that from the beginning the drug kept the surface healthy and free from offensive odor. He used the fluid extract in the proportion of 1 fluidrachm 8 ounces of water.

Miller† obtained a perfect cure in a ca of rebellious diarrhœa, accompanied wi night-sweats, in a child 4 weeks old.

Macauliffe‡ reports three cases in patier of scrofulous diathesis and subject to boils a stubborn character, which yielded co pletely in a week's time to the influence hydrastis administered internally in the dc of a dessertspoonful of the fluid extract fo times a day. In a fourth he prevented t regular yearly recurrence of the attack.

Vander Espt§ has greatly relieved a ca of syncopal dyspepsia.

Mays‖ has published an account of go results obtained in one case of gastric c tarrh, and in another of general enervati from alcoholic excess, due probably to a sen paralyzed condition of the spinal axis.

Bredin¶ finds hydrastis excellent in stages of gonorrhœa; and Gordon,** in great number of instances, has found no b ter remedy for uterine hemorrhage. In the cases the latter investigator has used exc sively the tincture, in from 20 to 30 drops, short intervals, until the bleeding is c trolled. It is then continued, in quantit of from 2 to 5 drops, every two or four hou according to the emergency of the case. menorrhagia, 2 to 5 drops of the tinctu every two or three hours, or oftener, usua gives prompt relief. After the flow is duced to its normal quantity, the minim dose is continued twice a day until the n menstrual period, when, if necessary, t larger doses are resumed. In dysmenorrhc dependent on chronic endometritis, from 7 10 drops of the tincture, with an equal amou of a solution of bromine (gtt. i to Oi), th times a day, have given satisfactory results

Blesch†† has reported the case of a child years of age, of scrofulous diathesis, sufferi from boils, that completely recovered unc hydrastis, in the course of five days. He e ployed in this instance the fluid extract in t dose of a teaspoonful every four hours.

* *London Lancet*, 1872, vol. i. p. 282.

† *College Journal of Medical Science*, 1858, vol. p. 485.

‡ *Ohio Medical Recorder*, vol. iii. p. 23.

§ *Journ. de Méd. Chir. et Pharmacol.*, Bruxel 1872, vol. liv. p. 324.

‖ THERAPEUTIC GAZETTE, May 15, 1886, p. 294.

¶ *London Lancet*, 1872, vol. i. p. 382.

** *Chicago Medical Journal and Examiner*, Aug 1877, p. 142.

†† *Ohio Medical Recorder*, Columbus, 1877–78, vol p. 205.

rther asserts that he has cured many similar ses in from three to five days, and considers e drug especially beneficial in scrofulous in affections, and superior by far to all her remedies.

The first observer who noticed the local æsthetic action of the drug in man was urnett,* of Philadelphia, who has successlly, in public and private practice, treated any cases of otorrhœa. He has noticed e anæsthetic effect of hydrastized boric id in cases where even the pure boric acid, hich is not an irritant application, has caused little smarting. In such instances the voltary remark by the patient, that the powder ntaining the hydrastis caused no discomrt, has been worthy of note.

Sattler † has also extensively used the drug ophthalmic and aural practice, and his relts have been most encouraging. He found advantageous in various diseases of the conjunctiva, chiefly in catarrhal inflammations, d more so in that variety known as conjunctivitis siccus and in the chronic forms. was observed to be of peculiar benefit in llicular conjunctivitis, and an efficient remly, in the granular form, in blepharitis marnalis, etc. He thinks that it exerts a "specific local effect by exciting a temporary, more less pronounced, hyperæmia of the conjunctiva, and, in consequence, active stimulaon of its vascular and secretory structures." these cases the preparation employed was e hydrochlorate of hydrastine, in from one five per cent. solutions; and it was obrved that in weak solutions the alkaloid as a tonic to the mucous membrane, in ronger ones more or less irritant, and in ill stronger solutions a powerful irritant. he drug was found of no value, and therere contraindicated in all affections of the rnea or iris, and in all deep-seated diseases the eye, the efficiency of its action being nited to functional and structural alterations the conjunctiva.

Sattler has also found the alkaloid of deded value in diseases of the ear, and in ese instances he employed it to modify or rest irritating and purulent discharges from e external auditory meatus, in which by far tter results were noticed than after the use the customary mineral astringents,—iodorm, boric acid, etc. He reports seven cases, o of acute and five of chronic purulent otitis media, in which the results were carefully observed. The powdered drug was applied to the mucous membrane after thoroughly syringing the external auditory canal and middle ear, and the results of systematic applications, especially in the chronic cases, were certainly favorable; all of them were benefited, the discharge being reduced in quantity, and its offensive and irritant qualities destroyed. It was likewise found that, even in cases of granulations and polypoid formations, the drug, applied in substance systematically, effected a disappearance of the exuberant growth.

Shoemaker ‡ has also published a very good contribution to the uses of hydrastis in diseases of the skin. He has employed it internally and as a topical application, and found the drug especially useful as a stomachic tonic and an hepatic stimulant in those cutaneous affections that chiefly depend upon gastro-intestinal disorders. According to his statements, seborrhœa sicca or oleosa, especially when dependent upon alimentary troubles, is greatly benefited, and sometimes disappears entirely by the use of 10 to 20 drops of the fluid extract three times a day. Excellent results are obtained in scrofulous affections of the skin, and in some cases of lupus, sycosis, boils, carbuncles, and ulcers, where the local condition may be attributed to an imperfect nutrition of the system. Eczema is likewise greatly relieved and even cured by the free use of the drug. In cases of eczema impetiginosum, or milk crust, in children, small doses (1 to 5 drops of the fluid extract three times a day) have produced very good results. In such instances the tonic action of the drug is most noticeable; and broken-down syphilitic subjects, in whom weakness and irritability of the alimentary canal are prominent features, from excessive use of alcohol and mercury, have been greatly relieved by hydrastis.

In all these cases the remedy has been employed internally and externally, but it appears that its range of usefulness is even greater as a local application. In this way the fluid extract exerts a stimulant and an astringent action upon the denuded or inflamed skin, and thus used produces also great benefit in disorders of the mucous membrane, such as stomatitis, syphilitic lesions, and eczema, especially in the fissured forms of the latter disease occurring on the lips, about

* *The Polyclinic*, December 15, 1885, p. 86.

† Lloyd's "Drugs and Medicines of North America," 84–85, vol. i. pp. 173–176.

‡ Lloyd's "Drugs and Medicines of North America," 1884–85, vol. i. pp. 177–181.

the anus, or between the fingers and toes. Other local lesions, such as ulcers, sinuses, granulations, abrasions, and so on, have been improved by the external use of hydrastis.

Notwithstanding the great benefit produced in many diseases by the topical employment of the drug, to its use has been attached a great objection by many practitioners,—namely, the staining which is generally imparted to the clothes. But since it has been ascertained that the chief power of the drug depends upon the principal alkaloid which it contains, hydrastine, and which in itself, or as the hydrochlorate especially, possesses all the therapeutic and physiological value of the plant, and is free from the staining qualities, the objection referred to loses its force and its *raison d'être*.

Shoemaker has used the salt in all the cutaneous diseases in which he had previously employed the fluid extract, and his observations have been equally and as highly encouraging. He has treated successfully cases of hyperidrosis, seborrhœa, acne, eczema, and ulcers. In such instances he has used the salt dissolved in alcohol in from 5 to 25 grains to the ounce, or as an ointment in the proportion of from 10 to 60 grains to the ounce.

Worthy of mention also are the uniformly excellent results obtained by Langdon* in six cases of acute gonorrhœa. In these instances he employed, *after* the subsidence of the first acute symptoms, injections of hydrastine hydrochlorate, in the proportion 1 to 2 grains to the ounce. The treatment was followed, in a few days, by the most flattering results. Even in gleet he has found the salt of the greatest value; but in these cases he thinks best to begin the local treatment with weak solutions (½ grain to the ounce), which can be increased gradually, according to indications.

In a lecture delivered in 1883 before the Congress of German Philosophers and Physicians, at Freiburg, Professor Schatz,† in speaking of the treatment of uterine hemorrhage, says, "In many particulars hydrastis and ergot are not unlike, but not infrequently hydrastis is efficient in cases of hemorrhage where ergot is powerless, or even of positive injury, as also in some cases of myoma. . . . In the non-gravid uterus the continuous administration of hydrastis causes a retardation of the menstrual period, with a diminution of the amount; it causes the pain to be le even in menorrhagia and dysmenorrhœa virgins, without any local causes, when p is absent. Its action in myoma is often qu remarkable. Hemorrhages caused in t manner diminish very much, or disapp entirely, after the use of hydrastis, ev where Bombelin's ergotin has been e ployed most energetically. I have obser a number of times that where hydrastis h been administered to virgins for menorrhag normal menstruation set in, and occasiona the catamenia did not make their appearar for one, two, or three months."

According to Professor Schatz, the acti of hydrastine on the uterus is almost witho an analogue. It was not only in hem rhages from uterine fibroids or myoma t the drug was useful; it was also found to of the greatest service in the hemorrha produced by other causes. He thus repo one case of congestive dysmenorrhœa; t cases from incomplete involution of pu peral uteri; some cases due to contracti cicatrices, and parametritis; some from dometritis and metritis; some of climacte hemorrhage; and other cases of bleeding virgins, where the hemorrhage continu after the use of the curette. These ca had failed to be relieved by all other mea but were cured by the administration of h drastis, generally in doses of 20 drops of t tincture three times daily.

Felsenburg‡ has used the drug with exc lent results, as a local application in the fo of the fluid extract, in a series of cases chronic pharyngitis, whether the disease w combined with enlargement of the tonsils not. He frequently used daily swabbin of the throat, and in a large number these cases he found great improveme both externally and internally. From the results he suggests the treatment of chro inflammatory diseases of other mucous me branes by the use of hydrastis.

In a recent paper Falk§ affirms to ha obtained great success in the treatment menorrhagia and metrorrhagia, and also hemorrhages which were dependent up metritis, endometritis, and pyosalpinx, a even in a number of cases of myoma. In these instances he employed *hydrastinine*, a substance obtained from hydrastine by process of oxidation.

* Lloyd's "Drugs and Medicines of North America," 1884-85, vol. i. p. 180.

† *Arch. f. Gyn.*, xxii., Heft. 1 u. 2, Berlin, 1884.

‡ *Wiener Medizinische Blätter*, No. 48, 1888.

§ THERAPEUTIC GAZETTE, February 15, 1890, 86–91.

Falk asserts to have treated successfully ven cases of metrorrhagia, in which no natomical lesions were present; in these, in hich the menstruation occurred every four- en days, and lasted eight to twelve days, e employment of hydrastinine injections ortened the period to five days, with an in- rval of from five to five and a half weeks. 1 two cases of pyosalpinx, the hydrastinine lieved the congestion of the genitals and creased the amount of hemorrhage. Equally od results were observed in eight cases of etrorrhagia, five of which were dependent 1 endometritis and three on chronic me- itis. Five cases, in which there existed a ndition of hyperplastic endometritis, were eatly improved by the use of the drug. In ese five cases, one of which was treated by peated abrasion of the uterus and another ergotin, but without avail, the hemorrhages ere successfully controlled by the use of hy- astinine in from two to eight weeks. Much tter results were obtained in nine cases of yoma of different sizes and character, and all of which hemorrhage was the source of mplaint. The bleeding, which lasted from ur to eight weeks, and was uncontrolled by gotin, yielded to the action of hydrastinine.

Summarizing his experience in the treat- ent of uterine hemorrhage, whatever the use, he finds successful results in 84.6 per nt. of the cases treated, and believes that e percentage of recovery would have been tably greater had he confined himself to e management of hemorrhages dependent on endometritis or myoma, or of menor- agia of a purely congestive character.*

The drug was employed in the form of in- ctions, varying from .05 to .15 gramme each a ten per cent. solution of the muriate hydrastinine, according to the indications each particular case.

Cabanes † recommends hydrastis as an ex- llent remedy in uterine hemorrhages and dysmenorrhœa, and, as the drug modifies e digestive functions, he affirms that the ug produces remarkable effects in dyspep- as, especially of alcoholic origin.

It may have been observed that *Hydrastis anadensis* has been tried extensively in the eatment of disease, with the greatest as- rted success; but the largest mass of clini- l evidence, so far studied by the author of this paper, seems to be based chiefly on the assertions made by practitioners, who, many of them at least, have not, unfortunately, published their cases in detail. However, in looking over the literature of the subject, he has been able to collect the most important cases, and, as a *résumé* of what has been claimed in favor of the therapeutic value of the *Hydrastis Canadensis*, will exhibit them in the tables on the following pages, in the hope that in this form the reports, briefly given, will prove of no little interest to the profession in general.

Of the aforesaid recorded authentic cases treated with hydrastis, there were

CURED.

	Cases.
Acute gonorrhœa	6
Hemorrhage from uterine myoma	6
Boils	5
Intermittent fever	4
Menorrhagia	3
Purulent ophthalmia	2
Eczema	2
Diarrhœa	1
Herpetic ophthalmia	1
Chronic conjunctivitis	1
Jaundice	1
Strumous ophthalmia	1
Cancer of breast	1
Cancer of rectum	1
Gleet	1
Acne	1
Seborrhœa sicca	1
Seborrhœa oleosa	1
Ulcers	1
Hyperidrosis	1
Congestive dysmenorrhœa	1
Hemorrhage from virgin uterus	1
Traumatic dysmenorrhœa	1
Hemorrhage from endometritis	1
Hemorrhage from metritis	1
In all	46

RELIEVED.

	Cases.
Chronic purulent otitis media	5
Climacteric uterine hemorrhage	4
Intermittent fever	2
Acute purulent otitis media	2
Eczema	2
Menorrhagia	2
Hemorrhage from endometritis	2
Hemorrhage from incomplete involution of puerperal uterus	2
Nebulæ	1
Syncopal dyspepsia	1
Gastric catarrh	1
General enervation	1
Inflammation of hair-follicles	1
Congestive dysmenorrhœa	1
Hemorrhage from virgin uterus	1
Hemorrhage from parametritis	1
Hemorrhage after normal pregnancy	1
In all	30

* All these cases, twenty-six in number, will be fully tailed by Falk in a future article, to be published in *Archiv für Gynäcologie.*

† *Thèse de Paris*, 1889; reviewed by the *Revue Géné- le de Clinique et Thérapeutique*, May 2, 1889, p. 745.

TABLES *containing a Brief History of Cases treated with Hydrastis Canadensis.*

No.	Age.	Sex.	Dose and form of preparation.	Disease.	Duration of treatment.	Result.	By whom and where reported.	Remarks.
1	4 weeks.	M.	Infusion. dose not stated.	Diarrhœa.	.....	Recovery.	Miller, T. C., *College Journal of Med. Science*, 1858, vol. iii. p. 485.	Night-sweats a prominent symptom.
2	52	M.	Powder locally applied.	Herpetic ophthalmia.	.....	Recovery.	Freeman, *Eclec. Med. Journal*, 1854, vol. ii. p. 2.	
3	10	M.	Powder: 1 drachm in 24 hours.	Intermittent fever.	....	Recovery.	Freeman, *ibid.*, 1854, vol. ii. p. 3.	
4	60	M.	Powder locally applied.	Chronic conjunctivitis.	.....	Recovery.	Freeman, *ibid.*, 1854, vol. ii. p. 4.	
5	55	M.	Powder: 1 drachm in 24 hours.	Jaundice.	.....	Recovery.	Freeman, *ibid.*, 1854, vol. ii. p. 7.	
6	21	M.	Powder locally applied.	Nebulæ.	.....	Improved.	Freeman, *ibid.*, 1854, vol. ii. p. 9.	
7	Not stated.	M.	Powder locally applied.	Purulent ophthalmia.	.....	Recovery.	Freeman, *ibid.*, 1854, vol. ii. p. 106.	
8	41	M.	Decoction to bathe eyes.	Purulent ophthalmia.	.....	Recovery.	Freeman, *ibid.*, 1854, vol. ii. p. 110.	
9	10	F.	Powder locally applied.	trumous ophthalmia tarsi.	17 days.	Recovery.	Freeman, *ibid.*, 1854, vol. ii. p. 193.	
10	Not stated.	F.	Tincture: 1 fluidrachm in 8 ounces of water; for local application.	Cancer of breast.	.....	Recovery.	Payne, E., *London Lancet*, 1872, vol. i. p. 282.	
11	Not stated.	Not stated.	Tincture: 1 fluidrachm in 8 ounces of water; for local application.	Cancer of rectum.	.....	Recovery.	Payne, E., *ibid.*, 1872, vol. i. p. 282.	
12	Not stated.	M.	Injection: preparation not stated.	Gleet of 7 month's standing.	2 weeks.	Recovery.	Bredin, J. N., *ibid.*, 1874, p. 259.	
13	4	M.	Fluid extract: a teaspoonful every 4 hours.	Boils.	5 days.	Recovery.	Blesch, P. E., *Ohio Med. Recorder*, 1877–78, vol. ii. p. 205.	Patient of decided scrofulous diathesis.
14	Not stated.	Not stated.	Not stated	Syncopal dyspepsia.	Not stated.	Greatly improved.	Vander Espt, *Journ. de Méd. Chir. et Pharmacol.*, Brux., 1872, vol. liv. p. 324.	
15	36	Not stated.	Fluid extract: a dessertspoonful 4 times daily.	Boils.	1 week.	Recovery.	Macauliffe, C. E., *Ohio Med. Recorder*, Columbus, vol. iii. p. 23.	Patient of scrofulous diathesis.
16	Not stated.	Not stated.	Fluid extract: a dessertspoonful 4 times a day.	Boils.	1 week.	Recovery.	Macauliffe, C. E., *ibid.*, vol. iii. p. 23.	Patient of scrofulous diathesis.
17	Not stated.	Not stated.	Fluid extract: a dessertspoonful 4 times a day.	Boils.	1 week.	Recovery.	Macauliffe, C. E., *ibid.*, vol. iii. p. 23.	Patient of scrofulous diathesis.
18	21	M.	Not stated.	Boils.	.....	Recovery.	Macauliffe, C. E., *ibid.*, vol. iii. p. 23.	The drug prevented the yearly regular appearance of the attack.
19	Not stated.	M.	Fluid extract: 3 drops every 3 hours.	Gastric catarrh.	5 days.	Very much relieved.	Mays, T. S., THERAPEUTIC GAZETTE, May 15, 1886, p. 294.	Gradually improved and was fully restored with the aid of iron and quinia.
20	Not stated.	M.	Fluid extract: 4 drops every 2 hours.	General enervation from alcoholic excess.	24 days.	Greatly improved.	Mays, T. S., *ibid.*, May 15, 1886, p. 294.	
21	Not stated.	Not stated.	Wayne's hydrastine: 20 grains, in 3 doses; given to prevent attack.	Intermittent fever.	.....	Violence of attack modified.	Bartholow, R., Lloyd's "Drugs and Medicines of North America," 1884–85, vol. i. p. 160.	Attack was prevented in the second administration.
22	Not stated.	Not stated.	Wayne's hydrastine: 20 grains, in 3 doses; given to prevent attack.	Intermittent fever.	.....	Violence of attack modified.	Bartholow, R., *ibid.*, 1884–85, vol. i. p. 160.	Attack was prevented in second administration.
23	Not stated.	Not stated.	Wayne's hydrastine: 60 grains, in divided doses.	Chronic intermittent fever.	.....	Recovery.	Bartholow, R., *ibid.*, 1884–85, vol. i. p. 160.	
24	Not stated.	Not stated.	Wayne's hydrastine: 65 grains, in divided doses.	Chronic intermittent fever.	.....	Recovery.	Bartholow, R., *ibid.*, 1884–85, vol. i. p. 160.	

BLES *containing a Brief History of Cases treated with Hydrastis Canadensis.*—(Continued.)

Age.	Sex.	Dose and form of preparation.	Disease.	Duration of treatment.	Result.	By whom and where reported.	Remarks.
Not stated.	Not stated.	Wayne's hydrastine: 80 grains, in divided doses.	Chronic intermittent fever.	.....	Recovery.	Bartholow, R., Llyod's "Drugs and Medicines of North America," 1884–85, vol. i. p. 160.	
Not stated.	Not stated.	Hydrochlorate of hydrastine locally applied.	Acute purulent otitis media.	.....	Benefited.	Sattler, R., Lloyd's "Drugs and Medicines of North America," 1884–85, vol. i. p. 171.	
Not stated.	Not stated.	Hydrastine hydrochlorate locally applied.	Acute purulent otitis media.	.....	Benefited.	Sattler, R., *ibid.*, 1884–85, vol. i. p. 171.	
Not stated.	Not stated.	Hydrastine hydrochlorate locally applied.	Chronic purulent otitis media.	.....	Benefited.	Sattler, R., *ibid.*, 1884–85, vol. i. p. 171.	
Not stated.	Not stated.	Hydrastine hydrochlorate locally applied.	Chronic purulent otitis media.	.....	Benefited.	Sattler, R., *ibid.*, 1884–85, vol. i. p. 171.	
Not stated.	Not stated.	Hydrastine hydrochlorate locally applied.	Chronic purulent otitis media.	.....	Benefited.	Sattler, R., *ibid.*, 1884–85, vol. i. p. 171.	
Not stated.	Not stated.	Hydrastine hydrochlorate locally applied.	Chronic purulent otitis media.	.....	Benefited.	Sattler, R., *ibid.*, 1884–85, vol. i. p. 171.	
Not stated.	Not stated.	Hydrastine hydrochlorate locally applied.	Chronic purulent otitis media.	.....	Benefited.	Sattler, R., *ibid.*, 1884–85, vol. i. p. 171.	
Not stated.	M.	Injection of hydrastine hydrochlorate: 1 to 2 grains to the ounce.	Acute gonorrhœa.	A few days.	Recovery.	Langdon, F. W., Lloyd's "Drugs and Medicines of North America," 1884–85, vol. i. p. 180.	
Not stated.	M.	Injection of hydrastine hydrochlorate: 1 to 2 grains to the ounce.	Acute gonorrhœa.	A few days.	Recovery.	Langdon, F. W., *ibid.*, 1884–85, vol. i. p. 180.	
Not stated.	M.	Injection of hydrastine hydrochlorate: 1 to 2 grains to the ounce.	Acute gonorrhœa.	A few days.	Recovery.	Langdon, F. W., *ibid.*, 1884–85, vol. i. p. 180.	
Not stated.	M.	Injection of hydrastine hydrochlorate: 1 to 2 grains to the ounce.	Acute gonorrhœa.	A few days.	Recovery.	Langdon, F. W., *ibid.*, 1884–85, vol. i. p. 180.	
Not stated.	M.	Injection of hydrastine hydrochlorate: 1 to 2 grains to the ounce.	Acute gonorrhœa.	A few days.	Recovery.	Langdon, F. W., *ibid.*, 1884–85, vol. i. p. 180.	
Not stated	M.	Injection of hydrastine hydrochlorate: 1 to 2 grains to the ounce.	Acute gonorrhœa.	A few days.	Recovery.	Langdon, F. W., *ibid.*, 1884–85, vol. i. p. 180.	
17	M.	Fluid extract: 10 drops 3 times a day, before meals. Externally, solution of hydrastine hydrochlorate: 10 grains to the ounce.	Acne of forehead, cheeks, and chin.	6 weeks.	Recovery.	Shoemaker, J. V., Lloyd's "Drugs and Medicines of North America," 1884–85, vol. i. p. 179.	Patient had feeble digestion and torpid bowels.
3	F.	Fluid extract: ½ drop, afterwards 1 drop, in milk, thrice daily. Externally, ointment of hydrastine hydrochlorate: 20 grains to the ounce of lard.	Eczema of face and scalp.	4 weeks.	Greatly improved.	Shoemaker, J. V., *ibid.*, 1884–85, vol. i. p. 179.	The red and infiltrated patches, which had resisted to all other treatment, soon yielded to the hydrastine ointment.
32	M.	Ointment of hydrastine hydrochlorate: 20 grains to the ounce.	Eczema of anus.	A few days.	Relieved and probably cured.	Shoemaker, J. V., *ibid.*, 1884–85, vol. i. p. 179.	After relief patient did not report for several weeks. Had been under other treatment before, with no apparent improvement.
27	F.	Ointment of hydrastine hydrochlorate: 20 grains to the ounce.	Eczema of the ears.	3 weeks.	Recovery.	Shoemaker, J. V., *ibid.*, 1884–85, vol. i. p. 179.	
36	F.	Ointment of hydrastine hydrochlorate: first of 5, afterwards of 10, grains to the ounce.	Eczema of the feet.	5 to 6 weeks.	Recovery.	Shoemaker, J. V., *ibid.*, 1884–85, vol. i. p. 179.	
22	M.	Alcoholic solution of hydrochlorate: 30 grains to the ounce.	Seborrhœa sicca of the scalp.	3 weeks.	Recovery.	Shoemaker, J. V., *ibid.*, 1884–85, vol. i. p. 179.	Disease followed an attack of typhoid fever.
24	M.	Ointment of hydrastine hydrochlorate: strength of 10 per cent.	Inflammation of hair-follicles of beard.	6 to 8 days.	Relief.	Shoemaker, J. V., *ibid.*, 1884–85, vol. i. p. 179.	2-grain doses of iodide of iron were administered internally.

TABLES *containing a Brief History of Cases treated with Hydrastis Canadensis.*—(Continued.

No.	Age.	Sex.	Dose and form of preparation.	Disease.	Duration of treatment.	Result.	By whom and where reported.	Remarks.
46	19	F.	Aqueous solution: first of 5, afterwards of 20, grains of hydrastine hydrochlorate to the ounce.	Seborrhœa oleosa.	2 weeks.	Recovery.	Shoemaker, J. V., Lloyd's "Drugs and Medicines of North America," 1884–85, vol. i. p. 179.	Uterine trouble, whic excited disease, wa removed, but th local lesion co tinued until relieve by the hydrastin treatment.
47	39	F.	Aqueous solution of hydrastine hydrochlorate: 30 grains to the ounce.	Hyperidrosis.	A few weeks.	Recovery.	Shoemaker, J. V., *ibid.*, 1884–85, vol. i. p. 179.	
48	13	F.	Ointment of hydrastine hydrochlorate: at first 10, afterwards 20, per cent.	Ulcers from broken-down lymphatic glands.	A little over a month.	Recovery.	Shoemaker, J. V., *ibid.*, 1884–85, vol. i. p. 179.	
49	50	F.	Not stated.*	Hemorrhage from multiple myoma of uterus.	8 to 10 weeks.	Recovery.	Schatz, *Arch. für Gynäcologie*, Berlin, 1884, p. 138.	Mucous polypi r moved, but did n good. Ergotin i creased bleedin Intrauterine inje tions of hydrastin were used every no and then. Appeti was improved an costiveness of bowe removed.
50	52	F.	.....	Hemorrhage from uterine multiple myoma.	2 weeks.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 139.	Complaint of 3 year standing. Injectio of ergotin twice dail for 6 weeks did n good.
51	Not stated.	F.	.....	Hemorrhage from uterine myoma.	6 months.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 139.	Scraping had been u successful.
52	49		.....	Hemorrhage from uterine myoma.	5 days.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 139.	Tumor continued grow in spite of e gotin injections, an the bleeding w profuse.
53	44	F.	.....	Hemorrhage from uterine myoma.	15 days.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 139.	Before treatment me struated profusel every 2½ week After use of hydra tis, periods becam normal, although th flow was somewh excessive.
54	42	F.	.....	Hemorrhage from uterine myoma.	Not stated.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 139.	The disordered me struation becam normal.
55	28	F.	.....	Congestive dysmenorrhœa.	Not stated.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 139.	Bleeding was so exce sive that the patie was obliged to go bed during me struation.
56	26	F.	.....	Congestive dysmenorrhœa.	Not stated.	Greatly relieved.	Schatz, *ibid.*, Berlin, 1884, p. 139.	
57	23	F.	.....	Bleeding of virgin uterus.	A week.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 139.	Surgical and oth means had been no avail.
58	13	F.	.....	Bleeding of virgin uterus.	Not stated.	Greatly relieved.	Schatz, *ibid.*, Berlin, 1884, p. 140.	Before treatment ha bleeding every 2 3 weeks, and co tinued as long as days at a time.
59	35	F.	.....	Menorrhagia.	Not stated.	Greatly relieved.	Schatz, *ibid.*, Berlin, 1884, p. 140.	Had not been relieve even by scraping.
60	Not stated	F.	.....	Dysmenorrhœa from mechanical cause.	8 weeks.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 140.	Drug, given in larg doses than usual, e tirely stopped me struation for months. After th the period rea peared, and co tinued normally.
61	30	F.	.....	Menorrhagia.	Not stated.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 140.	Scraping had done n good.

* Professor Schatz does not mention the dose nor the preparation used in each particular case, but he usually employed the *tinctu* in doses of 20 drops thrice daily.

ABLES *containing a Brief History of Cases treated with Hydrastis Canadensis.*—(Concluded.)

o.	Age.	Sex.	Dose and form of preparation.	Disease.	Duration of treatment.	Result.	By whom and where reported.	Remarks.
12	Not stated.	F.	....	Hemorrhage from parametritis.	For a week before menstruation.	Greatly relieved.	Schatz, *Arch. für Gynäcologie*, Berlin, 1884, p. 140.	
13	42	F.	.....	Hemorrhage from endometritis.	Not stated.	Greatly relieved.	Schatz, *ibid.*, Berlin, 1884, p. 140.	Scraping and ergotin had produced no benefit.
14	Not stated.	F.	.....	Menorrhagia in retroversion.	Not stated.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 140.	Scraping and use of ergotin for 6 months produced no relief.
15	26	F.	.....	Menorrhagia in retroversion.	Not stated.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 140.	
16	37	F.	.....	Hemorrhage from incomplete involution of puerperal uterus.	Not stated.	Greatly relieved.	Schatz, *ibid.*, Berlin, 1884, p. 140.	On suspension of hydrastine the bleeding would return.
17	33	F.	.....	Hemorrhage after normal pregnancy.	For a week before menstruation.	Greatly relieved.	Schatz, *ibid.*, Berlin, 1884, p. 141.	Bleeding would return on suspension of hydrastine.
18	Not stated.	F.	.....	Hemorrhage from incomplete involution of puerperal uterus.	Not stated.	Relieved.	Schatz, *ibid.*, Berlin, 1884, p. 141.	
19	32	F.	.....	Hemorrhage from endometritis.	6 months.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 141.	All other means had failed to arrest disease.
10	35	F.	.....	Hemorrhage from metritis	Not stated.	Recovery.	Schatz, *ibid.*, Berlin, 1884, p. 141.	
11	37	F.	.....	Menorrhagia.	Not stated.	Relieved.	Schatz, *ibid.*, Berlin, 1884, p. 141.	
12	29	F.	.....	Hemorrhage from chronic endometritis.	3 days.	Relieved.	Schatz, *ibid.*, Berlin, 1884, p. 141.	
13	48	F.	.....	Climacteric uterine hemorrhage.	Not stated.	Relieved.	Schatz, *ibid.*, Berlin, 1884, p. 141.	Drug produced unpleasant excitement of patient.
14	47	F.	.....	Climacteric uterine hemorrhage.	Not stated.	Greatly relieved.	Schatz, *ibid.*, Berlin, 1884, p. 142.	
15	45		....	Climacteric uterine hemorrhage.	Several months.	Greatly relieved.	Schatz, *ibid.*, Berlin, 1884, p. 142.	Scraping, and even removal of large portions of hypertrophied mucosa, produced no improvement; neither did ergotin. Hydrastine likewise improved the appetite.
16	Not stated.	F.	.....	Climacteric uterine hemorrhage.	Not stated.	Relieved.	Schatz, *ibid.*, Berlin, 1884, p. 142.	

In conclusion, these statistics, incomplete s they may be, are highly encouraging, and ppear to show, without doubt, the great value f *Hydrastis Canadensis* as a therapeutic gent in the treatment of diseases widely apart from one another, especially so in most cases of uterine hemorrhage, in which the drug seems to act almost as a specific. Certainly the medicine recommends itself for further trials at the hands of the profession.

*TUBERCULOUS MANIFESTATIONS IN THE UPPER AIR-TRACT, AND SPECIAL TREATMENT THEREOF.**

By John O. Roe, M.D., Rochester, N.Y.

THERE are two forms of destructive ulceration of the upper air-passages in which bacilli act as the exciting cause. The one is that which is termed "tuberculosis," and the other "lupus." These two affections vary in the degree of their activity, notwithstanding the fact that the bacilli, in each instance, appear to be, according to Koch, identical. It is, however, denied by Kaposi that there is any such identity or similarity between the two organisms. Our colleagues, Drs. Gibbes and Shurley,† claim that the relationship between the tubercle bacillus and the cause of tubercular disease is by no means settled. They say, "The bacillus cannot be found in the earliest stage of the change it is supposed to initiate."

This is unquestionably true. An inflammatory change antedates the tuberculous invasion. Without this preparatory change tuberculous inoculations would not take place, and if bacillary inoculation did not take place there would be no tuberculosis.

The tuberculous form of ulceration usually produces infiltration and a rapid destruction of the tissues, while, in the lupus form, the destruction goes on more slowly, and is less destructive to life.

The order of frequency in which tuberculosis appears in the nose, throat, and adjacent parts is as follows: It is most frequent in the larynx; less frequent in the tongue, the pharynx, the mouth, the velum patali, the tonsils, and least frequent in the nasal passages. With lupus the frequency of its occurrence is in the inverse order, being most frequent in the nose, less frequent in the pharynx, and least frequent in the larynx.

Tuberculosis of the upper air-passages may be either primary or secondary to a development of the disease in the lungs. The question of the development of tubercle in the upper air-passages, particularly in the larynx, independent of a disease in the lungs, has been both denied and affirmed by many able observers. Von Ziemssen, Morell Mackenzie, Klebs, Bosworth, and Beverly Robinson claim that it is simply a destructiv ulceration of the parts coincident with tu berculosis of the lungs, and that tubercl plays a very secondary part, if any, in it production. Virchow, on the contrary, find the larynx the most favorable and appropri ate place for the study of true tubercle.

It is claimed, on the one hand, by Orth Schrötter, Schech, Lefferts, Bresgen, Volte lini, and Heinze that it is only in very rar cases that the larynx is primarily affecte by tuberculosis; while, on the other hanc others, as Lennox-Browne and Hunter Mac kenzie, state that primary laryngeal tube culosis is not such a rare affection as Ort affirms.

Notwithstanding the fact that clinical ob servation teaches us that in many cases ur questionable tuberculosis appears in th larynx long before there is any pulmonar complication, we have but three cases re corded in which the post-mortem examin tion could be made sufficiently early in th disease to establish the fact of tuberculou deposits in the larynx, while the lungs wer perfectly normal. One such case has bee reported by Orth,‡ one by Pogrebinsky,§ an one by Demme.‖ Since it has been affirme by Koch that development of tuberculos depends upon the bacilli, and that witho the bacilli we can have no tuberculosis, would seem that the whole subject regardir the etiology of this disease was definite settled, and that primary tuberculosis cou be established wherever a suitable feedin ground for the bacilli exists, whether in th nasal passages, in the pharynx, in the laryn in the lungs, or in any part of the body which the bacilli gain access.

Primary tuberculosis, or, clinically spea ing, those cases in which the development the disease in the upper air-passages antedat any perceptible change in the lungs, usua runs a very rapid course in the larynx an pharynx, but in the nose it is usually slow its progress, and may continue in some cas for months, and even years, without acti symptoms. . Even in the larynx it is oft slow, and does not take an active form un it reaches the second stage, or that of ulcer tion. Secondary tuberculosis of the upp air-passages is nearly always rapid in

* Read in the "Discussion of Tuberculosis" before the Medical Society of the State of New York, February 4, 1891.

† *The American Journal of the Medical Sciences*, May, 1890.

‡ "Lehrbuch der Spec. Path. Anat.," 1885, p. 21;

§ "Works of Phys.," from Odessa, i.–iv., 18 Quoted from Sedziak (*Journal of Laryngology & Rhinology*, 1889, vol. iii. p. 218).

‖ Vide *Internat. Centralblatt*, Bd. i. p. 213.

progress, and when attacking the larynx the added irritation in this part materially hastens the march of the disease in the lungs.

Tuberculosis of the larynx may thus be either acute or chronic. In the acute form the disease runs a very rapid course, is attended with marked disturbance of the system, and is that form which is most directly associated with tuberculosis of the lungs. The chronic form is most frequently found in the larynx as a primary disease, and is in this stage often overlooked.

Tuberculosis of the upper air-passages is usually developed in persons having a depressed and debilitated condition of the general system, and a chronic disease of the part in which it makes its appearance. There are, however, some instances in which the disease is developed in persons in apparently good health.

The diagnosis of tuberculosis of the upper air-passages is, in the larynx and pharynx, ordinarily easy, but in the nasal passages, in some cases, very difficult. The finding of the bacilli in the secretions and structure of the part settles the question at once. The characteristic appearance of tuberculosis of the larynx, particularly in its early stage, is, in many cases, so clear and distinct that the merest tyro cannot fail to arrive at a correct diagnosis; but there are other cases in which the disease is not well defined, or is so complicated or associated with other constitutional diseases, such as syphilis, that the diagnostic acumen of the most experienced observer is taxed to its utmost, and a correct diagnosis can only be arrived at after a very careful study of the case. It is not unfrequently the case that there may be an active coexistence of tuberculous and syphilitic laryngitis, and the lesions of one process may so mask that of the other that a differential diagnosis is impossible. This fact, which has been emphasized by Rice* and Luc,† is too often overlooked in the diagnosis and treatment of tuberculosis of the upper air-passages, and particularly the larynx. In the uncomplicated form the ulceration of tuberculosis and of syphilis can be very readily differentiated by their appearance alone.

For convenience of study I have employed, though slightly modified, the excellent tabulated form, made by Bosworth,‡ of the principal diagnostic features of each disease. In so doing I have omitted his third column, in which he gives the differential appearance of scrofulous ulcers, for the reason that, like Lennox-Browne,§ I do not recognize that disease, but believe that which Bosworth terms "scrofulous ulceration" is simply a modified form of tuberculous ulceration.

SYPHILITIC ULCERS.	TUBERCULOUS ULCERS.
1. Excavated deeply	Excavation not apparent.
2. Granulations few, and and those highly inflammatory.	Granulations many and indolent.
3. Areola deep red.	Areola faint.
4. Edges sharply cut.	Edges irregular and ill defined.
5. Demarcation distinct.	Demarcation indistinct.
6. Secretion yellow, purulent.	Secretion grayish, ropy mucus.
7. Discharge profuse.	Discharge scanty.
8. Penetrating to deeper tissues.	Superficial, with lateral in place of deep.
9. Fever absent.	Fever high.

The above classified list of appearances applies more specifically to the manifestations of tuberculosis as seen in the pharynx, but may be also taken as the characteristic differentiation between the two diseases when affecting the mucous membrane in any portion of the upper air-passages.

In the case of tuberculosis of the larynx, attention should first be directed to the distinction between laryngeal phthisis or laryngeal tuberculosis and the laryngitis of phthisis or of pulmonary tuberculosis. In the former we find in the larynx a tuberculous disease; while in the latter there is only a very irritable chronic laryngitis aggravated by the irritating sputum and the cough and general debility of the system.

In the chronic form of tuberculous disease of the larynx, the first appearance to attract our attention is a condition of anæmia associated with a tumefied or œdematous condition of the arytenoid bodies, giving them a pear shape. This early swelling or infiltration of the larynx is very often associated with excrescences, growing from the inner side of the arytenoid commissure, having the characteristic appearance of papillary growths.

* "Transactions of the American Laryngological Association," 1889, p. 97.

† "Contribution à l'Étude des Lésions combinées de la Syphilis et de la Tuberculose dans le Larnyx." Paris, 1891, p. 14.

‡ "Diseases of the Nose and Throat." New York, 1881, p. 159.

§ "The Throat and its Diseases," 3d ed., London, 1890, p. 217.

Such growths are, however, not regarded by Gouguenheim and Glover* as tumors having a special nature, but an inflammatory production. To John N. Mackenzie† is due the honor of first pointing out the tuberculous nature of these growths by means of a histological and bacteriological examination, although Ariza,‡ of Madrid, claims the priority of describing two cases of growths of the larynx of a tuberculous nature. During the past eight years many cases of tuberculous growths of the larynx have been reported. An exceedingly interesting case of tuberculous growths of the epiglottis has recently come under my observation in an apparently healthy man, 28 years old. The tumor was broad and sessile, and attached to the posterior surface near the upper border. There was a moderate amount of inflammatory thickening of the epiglottis on the left side, and also of the left ventricular band, but there was no active trouble present. The lungs were normal, and there was very little cough. Microscopic examination revealed the true nature of the growth.

These tuberculous vegetations, as they may be appropriately called, must be differentiated from chronic laryngitis with papillomata, and also from tertiary syphilis with vegetations. There may also be marked infiltration of the epiglottis, the ventricular bands, or of the whole larynx in general. Sometimes the epiglottis is the part first involved in the infiltration, and it may be nearly destroyed by ulceration before other portions of the larynx become seriously involved.

In the acute form of laryngeal tuberculosis we do not find the first stage of the disease characterized by that paleness of the chronic form, but there is from the beginning marked congestion and redness incident to an acute inflammation.

The second stage of the disease is that of ulceration, the appearance of which I have already described.

The third stage is that of perichondritis and necrosis of the cartilages.

The early stages of pharyngeal tuberculosis are also characterized as in the larynx by a peculiar pallor, and a pale-grayish color of the whole buccal cavity. Sometimes there are seen in the soft palate small grayish nodules, or tumors, which break down and mark the beginning of the ulceration. In one case, Schnitzler§ diagnosticated a case of incipient tuberculosis from the appearance of these grayish tumors in the uvula and arch of the palate, and subsequent development of the disease in the pharynx and lungs confirmed the diagnosis.

Isambert‖ and Fraenkel¶ were the first to give an accurate description of tubercular manifestation in the pharynx, and they elucidated it so clearly and fully that little has been left to be added by subsequent observers.

The ulcers are usually small in size and quite numerous and have a tendency to coalesce rather than to penetrate deeply. Laboulbein likens the appearance of the ulceration to the track of an earth-worm in moist sand, while Fraenkel likens the surface to that of cut bacon. The worm-eaten appearance and general character of the ulceration has, in some instances, led observers to look upon it as an aphthous erosion of the mucous membrane.

Tuberculosis commencing in the pharynx may extend to the tongue, the buccal cavity, and to the larynx ; whereas, tuberculous ulceration beginning in the larynx has not been observed to extend to the pharynx.

The characteristic appearances of nasal tuberculosis are not so well defined. The disease is almost invariably confined to the septum. In the early stage there is seen small, yellowish granulations, or tubercles, the size of a mustard-seed, which soon break down and form the characteristic ulcerations. The ulcers are usually filled with a greenish, bloody secretion, and covered with a brown crust, more or less adherent, and the surrounding mucous membrane is infiltrated and swollen. Often associated with this ulceration are tuberculous growths of the size of a pea or bean, although in some instances, as observed by Plicque,** they may grow so large as to fill the nasal fossæ. These should be carefully differentiated from nasal polyps, and the ulceration of this disease from syphilitic ulceration.

The first subjective symptoms of laryngeal phthisis is that of failure or marked hoarse-

* "Ann. des Malad. de l'Oreille et du Larynx," tome xvi. p. 512.

† *Maryland Med. Journ.*, June, 1882, vol. ix. p. 55.

‡ "Siego Med.," Madrid, 1883, vol. xxx. p. 259.

§ Lennox-Browne, "Dis. of Throat and Nose," op. cit., p. 217.

‖ "Annal. des Malad. de l'Oreille et du Larynx," tome ii. p. 162.

¶ *Berl. Klin. Wochenschr.*, 1876, xii. 657.

** "Dis. of the Mouth, Throat, and Nose." Eng. trans., 1886, p. 177.

ness of the voice. This increases until there is complete aphonia, or only a toneless whisper. Cough is a prominent symptom, and in the later stages of the disease is often very distressing. Respiration is but little affected until the swelling of the larynx is sufficient to cause a mechanical impediment. There is also associated with it high fever and a systemic disturbance. In case of extreme swelling of the arytenoids, deglutition becomes difficult, and when ulceration becomes extensive, deglutition becomes extremely painful.

The principal subjective symptom of pharyngeal tuberculosis is that of painful deglutition. As Schech* observes, patients often prefer to suffer hunger and thirst rather than endure the agony of deglutition. Fluids are often regurgitated, and the swallowing of solid food finally becomes impossible. The breath has a very offensive odor characteristic of the disease.

Treatment.—The local treatment of tuberculous disease in the upper air-tracts is, first, palliative, and second, radical. The former is demanded in those cases where the tuberculous process in the upper air-passages is secondary to an incurable form of the disease in the lungs. The latter is employed in all cases of primary tuberculosis, and wherever the extension of the disease can be prevented by the removal or destruction of the localized tuberculous deposit.

The palliative treatment consists in the use of sedative and soothing applications. Irritating substances, such as nitrate of silver, so justly condemned by Williams, should never be applied to a tuberculous throat. The best remedy that we have of this class is iodoform, applied in the powdered form or dissolved in ether. The best substitutes for iodoform are iodol and iodide of starch. The latter I have found in some cases as efficacious as iodoform. Menthol, first introduced by Rosenberg,† has proved to be a remedy of great value, on account of its anæsthetic, analgesic, and antiparasitic properties. Its value in the treatment of laryngeal tuberculosis has been affirmed by Lennox Browne, McBride, Brune, Potter, Knight, and others. It is best employed in from ten to twenty per cent. in an oily solution. A great number of other drugs have been recommended for the treatment of this disease, such as lactic acid, creolin, creosote, carbolic acid, chromic acid, boric acid, thymol, iodine, chloride of zinc, hydrate of chloral, charcoal, hot-air inhalations, etc.

The radical measures consist in the destruction or removal of the tuberculous deposits. Pre-eminent in the list of chemical reagents for this purpose stands lactic acid, which was introduced by Krause‡ in 1885, and must be regarded as the most valuable remedial agent which has been added to the local therapeutics of tuberculous disease. Krause demonstrated that, by means of lactic acid, tuberculous ulceration of the larynx could be converted into simple ulceration, the bacilli destroyed, and the tuberculous process completely arrested. The experience of other observers in the use of lactic acid soon corroborated that of Krause, and many excellent and even brilliant results have been reported from its use by Heryng, Gottstein, Major, Jellinck, Schmieglow, Gouguenheim, and others. The observations and experiments of Mossetig Moorehof upon lupus of the skin showed that lactic acid acts energetically upon pathological tissues, but, at the same time, has no effect upon sound tissue. This observation led Krause to employ lactic acid in laryngeal tuberculosis, although, when applied to mucous membrane, it is only in weaker solutions that it confines its actions to diseased tissues. Lactic acid is, however, not applicable to every form of tuberculous disease. The use of the acid is only effectual in small, superficial ulcerations and soft infiltrations, and when the disease is in a quiescent condition. When the disease is in the stage of inflammatory activity, good results have not been obtained, owing to the serious inflammatory complications that commonly arise. In these conditions Krause considers the use of the acid contraindicated.

Krause first applied the acid in the form of brushings. Later on he adopted the plan of scraping the ulcer first, and then thoroughly rubbing the acid into the exposed surface, so as to bring it in contact with every portion of the tuberculous deposit. He commenced with a weak solution, and increased it to forty, fifty, or sixty per cent. Some have employed it in the pure state. In applying it, one should always begin with a weak solution, and rub it thoroughly into the ulceration by means of a laryngeal cotton carrier, which is much cleaner and to be

* "Ann. des Malad. de l'Oreille et du Larynx," tome xvi. p. 805.

† *Berl. Klin. Wochenschr.*, 1885, No. 28, S. 449.

‡ *Berl. Klin. Wochenschr.*, 1885, xxii. 462.

preferred to the brush. The strength of the solution should depend upon the amount of reaction, and it should only be reapplied after the reactive inflammation has disappeared and the dead tissue has been thrown off. Before the application of the acid, the larynx should be thoroughly anæsthetized by cocaine to prevent the extreme pain which would otherwise be caused by the acid. The beneficial effects of the acid are seen in the diminution of the infiltrations, the formation of sound granulations, the clearing of the ulcers, and, finally, in their cicatrization. In cases of hard infiltrations and deep ulcerations, Heryng* and Major† have obtained excellent results from parenchymatous injections of lactic acid of the strength of about ten per cent.

The surgical treatment of laryngeal tuberculosis may be said to have been introduced by Moritz Schmidt,‡ of Frankfort, who was the first to advocate puncture and incision. This was employed alone by Schmidt, but it has also been used by some as preliminary to the rubbing in of lactic acid. It was observed, however, that the most beneficial results were obtained from fairly deep incisions, although the wounding of the deep structures should be guarded against.

The observation of Heryng,§ that relapses of healed laryngeal ulcers were always present in cases where there were deep tuberculous infiltrations not reached by the acid, led him to adopt the method of curettement. This method is employed for the same purpose that Volkman's spoon is employed in general surgery, and its object is apparent. By it the deeper tuberculous infiltrations are not only removed, but made freely accessible to the action of the acid, which is always to be used after the curette, and thoroughly rubbed into the bottom of the exposed surface. Different shaped curettes are, of course, necessary for different portions of the larynx, and certain portions of the larynx are more accessible than other portions. The posterior walls of the larynx, the ventricular bands, the inner surface of the arytenoids, and the lower portions of the epiglottis, are the most accessible for curetting. For the removal of granulations and infiltrations on the upper surface of the posterior walls, the double curette of Krause‖ and Gouguenheim¶ is the most suitable instrument. This instrument consists of two small, double-cutting blades, one forced down upon the other, so that the tissue coming within its grasp is readily taken away.

Those who have had experience in the treatment of these diseases cannot fail to be of the unanimous opinion that the lactic acid treatment and curettement of Krause and Heryng are the greatest advances that have yet been made in the radical treatment of tuberculosis of the upper air-passages.

As Sedziak very truly says, "The time of therapeutic nihilism in regard to laryngeal phthisis has disappeared to return no more."** Formerly a patient afflicted with tuberculous diseases of the larynx and pharynx was considered to be beyond the reach of medical assistance. Now the application of surgical means for the removal of the tuberculous mass is as unhesitatingly undertaken in the treatment of tuberculous diseases of the larynx and pharynx as of the skin and bones.

The adoption of these radical measures are, however, only made possible by the assistance of cocaine, since under general anæsthetics they are impracticable. Cocaine, therefore, marks as distinct an epoch in laryngology, as chloroform and ether in general surgery.

Tracheotomy has been recommended in laryngeal phthisis for the purpose of giving the larynx rest. I, however, agree with Cohen and some others that it is an unwarrantable procedure, not only increasing the suffering of the patient, but aggravating the disease in the lungs. It is only permissible in obstructive swellings of the larynx, and these can be dealt with successfully by the radical measures already described.

Lastly, we have to mention the treatment by the use of Koch's lymph. The value of this method, however, has not been settled, but should a portion of the excellent results that have been reported prove to be permanent, this discovery will mark a great epoch in the treatment of tuberculosis.

* "Gag. lek. Warszawa," 1886, 2 S. vi. 564.

† *Philadelphia Medical News*, 1886, vol. xlix p. 555.

‡ *Congrès Internat. de Laryngologie*, 1890; *Comptes-Rendus*, Milan, 1882, p. 100.

§ *Deutsch. Med. Wochenschr.*, Leipsic, 1887, Bd. xiii. p. 126.

‖ *Therap. Monatschr.*, Berlin, 1889, Bd. iii., S. 203.

¶ "Ann. des Malad. de l'Oreille et du Larynx," Paris, 1890, tome xvi. p. 525.

** *Journal of Laryngology and Rhinology*, 1889, vol. iii. p. 227.

*PREVENTION OF PUERPERAL ECLAMPSIA BY THE INDUCTION OF PREMATURE LABOR.**

By Henry D. Fry, M.D., Washington, D. C.

In February, 1883, I presented a paper to the Washington Obstetrical and Gynæcological Society on the etiology and prophylactic treatment of puerperal eclampsia,† and I desire, with your permission, to quote the conclusions arrived at by a study of the subject offered at that time.

They were—

1. Albuminuria, occurring during pregnancy, is the sign of a pathological change, or of pathological changes, indicative of a predisposition to eclampsia.

2. The prophylactic treatment of eclampsia, therefore, includes measures adopted to prevent the occurrence of albuminuria. These are,—to improve the condition of the blood by the administration of tonics, iron and a liberal dietary; and to relieve the renal congestion by attention to the functions of the skin, and by prohibiting the wearing of tight clothing.

3. The urine of all pregnant women should be systematically examined for albumen after the fifth month of utero-gestation, and earlier if any suspicion be entertained of renal complication.

4. With the recognition of the affection, treatment should be directed to its relief. This is divided into general, dietetic, medicinal, and

5. Obstetrical. The latter comprises the graver cases of the disease, which, not yielding to treatment, demand, by the urgency of their symptoms, prompt operative interference.

During the years that have elapsed since that paper was written, I have carried out the conclusions above presented, and have not had a single case of puerperal eclampsia to occur in my own *clientèle*. Albumen was found in the urine of a certain proportion of the cases, but by treatment it either disappeared or remained small in amount, and gave rise to little apprehensions, except in a few instances. These few instances form the subject of my present observations, and bring up the question of operative interference in the class of cases referred to under the head of obstetrical treatment. The amount of albumen in the urine does not alone furnish evidence of the gravity of the case. Convulsions have been noted when no albumen existed in the urine, and yet post-mortem examination revealed serious organic disease of the kidney. The total quantity of urine passed in twenty-four hours, the amount of solid ingredients contained, together with the symptoms of the patient, furnish criteria for action. Serious toxæmic symptoms may manifest themselves when only a trace of albumen in the urine had produced a feeling of security.

Examinations of the urine should be made every few weeks, and oftener if there be any indication of renal insufficiency. The specimen examined should be taken from the entire quantity passed in twenty-four hours. This amount must be ascertained, and the specific gravity estimated. These results furnish evidence whether further investigation (microscopic, etc.) is called for.

When serious symptoms develop and treatment has proved unavailing, the induction of premature labor offers the hope of saving mother and child. Fortunately, the question of ending gestation is rarely brought up for consideration before the seventh month. The child is then viable, and has a better chance of surviving, if born prematurely, than if allowed to remain and be nourished by the poisoned blood of the mother.

The nearer gestation has approached its normal duration before labor begins, the better; but if the symptoms are threatening, it is unwise to delay on this account. Better act a little too soon than too late.

The use of the *couveuse* increases materially the chances of survival of the premature or feeble infant. Out of eight hundred and twenty-nine premature children, whose average weight was four and a half pounds, six hundred and sixty-two lived; and recently infants have been saved by the use of the *couveuse* when only six months advanced in intrauterine life. By the employment of artificial feeding, or gavage, in combination with the *couveuse*, the viability of the infant may be placed at six months.

By these means Tarnier‡ has succeeded in saving children at 6 months, 30 per cent.; at 7 months, 63.6 per cent.; at 8 months, 85.7 per cent.

The following case recently came under

* Read in Section of Obstetrics of American Medical Association, May 5, 1891.

† *American Journal of Obstetrics*, vol. xviii. pp. 50–72.

‡ Budin, quoted in "Am. Sys. of Obstet.," vol. ii. p. 201.

my observation, and represents the advantages of this line of treatment:

Mrs. X., aged 30, a primipara, was placed under my care by Dr. N. S. Lincoln on November 4, 1890. She had arrived in Washington a few days before, after a very trying journey across the continent. Until she reached Chicago she had entire charge of an invalid mother, and, being compelled to wait on her at night, she contracted a cold. When I saw her she complained of shortness of breath, loss of voice, and sore throat. She also suffered from insomnia, headache, nausea, and at times vomiting. She was anasarcous. Pregnancy had advanced to the seventh month. Fœtal movements were distinct; the heart-sounds normal, and situated below and to the left of the umbilicus.

On the next day, November 5, a specimen of urine was obtained, and on examination was found to contain twenty-one per cent. of albumen. The microscope revealed the presence of hyaline casts in large quantity. The patient was kept in bed, a hot bath, temperature of 100°, given daily, and flannel worn day and night. The bowels were moved daily by sulphate of magnesium. Diet consisted of skimmed milk.

November 6.—Twenty-four ounces of urine passed; sp. gr., 1010; albumen, twenty-one per cent.

November 7.—Sixteen ounces of urine passed; sp. gr., 1018; albumen, nineteen per cent.

November 8.—Fourteen ounces of urine passed; sp. gr., 1016; albumen, twenty-one per cent.

November 9.—Seventeen ounces of urine passed; sp. gr., 1026; albumen, thirty-one per cent.

November 10.—Twenty-two ounces of urine passed; sp. gr., 1018; albumen, twenty-four per cent.

November 11.—Twenty-four ounces of urine passed; sp. gr., 1023; albumen, twenty-seven per cent.

November 12.—Fourteen ounces of urine passed; sp. gr., 1017; albumen, eighteen per cent.

November 13.—Twelve ounces of urine passed; sp. gr., 1023; albumen, twenty-seven per cent.

As the condition of the patient did not improve under treatment, and the amount of urine excreted each twenty-four hours remained so much below normal, I feared to delay longer. The short breathing, which was particularly distressing at night, I attributed to uræmic poisoning of the nerve-centres. The lungs were perfectly clear. The insomnia, nausea, and headache were unrelieved. My suggestion to induce labor met with Dr. Lincoln's approval, and, after conferring with the husband of the patient, and at his request, Dr. Taber Johnson's counsel was sought.

Dr. Johnson saw the patient with me on November 13, and considered favorably the propriety of inducing labor.

Preparations having been made already, the patient was placed in position, and the parts exposed with a Simm's speculum. After cleaning the vagina and cervix with a carbolized solution, a bougie was passed full length between the membranes and uterine walls.

Pains set in after six or seven hours, and continued with varying intensity during Thursday night. The head presented in first position, and, beyond a slight descent into the pelvic cavity, little change took place during Friday. The cervix retained its full length, and was dilated sufficiently to pass the finger to the internal os. Early Friday night the membranes ruptured spontaneously; later, the internal os dilated, and the cervical canal became obliterated. The external os dilated irregularly; the half on the right side remained thick and undilated. The left half became thin and retracted. The opening, in consequence, was situated on one side, and the thickened right edge occupied the middle of the vaginal passage. At eight o'clock Saturday morning the os was about two inches in diameter, and, as I feared to temporize longer, I requested that Dr. Taber Johnson should see the patient again.

He arrived promptly, and, after making an examination, considered it advisable to apply the forceps and employ it for the purpose of dilating the os. The patient was put under the influence of chloroform, and the right blade inserted before the left. The blades were applied in this manner because the adjustment of the right blade brought the displaced os into the centre of the vaginal passage, and facilitated the application of the second branch.

Intermittent traction was made until the os had dilated, and delivery was then effected without further trouble. The perineum was uninjured, but there was a slight tear, about one inch in extent, of the vaginal mucous membrane on the right side of the median line posteriorly. This was closed with a continuous silk suture.

The infant, a female, measured eighteen inches in length, and weighed five and a half pounds. It was asphyxiated at birth, but soon responded to peripheral irritation, and cried lustily.

The mother had a normal convalescence, and on the second day after childbirth the amount of albumen in the urine had decreased to eight per cent. The total quantity passed each twenty-four hours varied from fifty to seventy ounces. Examination of the urine made recently failed to detect any albumen or casts, and the mother has fully recovered her health.

The infant was placed in the *couveuse*, and the temperature maintained at 100° F. for ten days, and then at 90° for three weeks longer. At the end of the fourth week it was sufficiently developed to be removed from the apparatus.

The mother being unable to nurse the baby, the food consisted of diluted peptonized milk, with the addition of cream. Later, the proportion of cream was increased, and milk-sugar added. At first half an ounce was administered at a time, and subsequently the amount increased in proportion to its needs. Sterilized milk was finally substituted for the above, and gave better results.

At the end of the first week, the baby had lost half a pound; at the second, its weight was the same; at the third, it had gained half a pound; and from this time it increased in weight at the rate of one-half to three-eighths of a pound weekly.

To further emphasize the value of this method of treatment, I wish briefly to mention the following additional cases that came under my observation:

On June 17, 1888, I induced labor at the thirty-fourth week under the following circumstances:

Mrs. F., at her third pregnancy, had considerable albumen in her urine and some evidence of toxæmia. I felt no little apprehension when her labor came on, but she passed safely through the ordeal. Her convalescence was extremely protracted, owing to coexistent cardiac disease.

The fourth pregnancy and labor were very similar to the preceding, and convalescence likewise protracted.

In the fifth pregnancy the conditions were very much aggravated in spite of energetic treatment. Violent headache and impaired vision were prominent symptoms. At eight and a half months, as above stated, labor was induced by the introduction of a bougie. The uterus responded after a few hours' delay, and the child was born without the appearance of any alarming symptoms in the mother. Convalescence was rapid, and she sat up on the tenth day. In this case organic disease of the kidneys was compatible with fairly good health, except when pregnancy existed. Each succeeding pregnancy presented graver symptoms.

Of the three children born in these labors, the only one living at present is the one prematurely born by induced labor. Both the others died from intestinal diseases when a few months of age.

The next two cases were seen with Dr. W. W. Johnston, and occurred within two weeks of each other.

Mrs. M., a primipara, advanced about eight months, presented serious symptoms despite treatment directed for relief of albuminuria. November 27, 1888, labor was induced by the introduction of a bougie into the uterine cavity. Unusual difficulty was met with in performing this little operation on account of the existence of what has been so fully described by Dr. Busey as cystocolpocele. The red tumor formed by the projection of the vesico-vaginal wall so completely blocked the genital passage that it baffled all efforts to insert the instrument. One variety of speculum after another was tried and abandoned. Finally, by touch, the bougie was placed in position. Labor-pains came on in due time, and, when the os had dilated, the child was delivered by forceps applied to the breech.

Mother and child recovered.

The last case, also a Mrs. M., a primipara, presented alarming symptoms during the latter part of her pregnancy. On December 10, 1888, the bougie was placed in position. The uterus failing to respond to the irritation, it was removed, and a second one inserted in a different direction. Feeble uterine action was supplemented by dilatation with Barnes's bags, the smallest size being replaced after a few hours by the largest. When the os had dilated, labor was terminated with the forceps. Several hours afterwards the mother had convulsions, and for a time was in a critical condition. She finally recovered, and the child lived.

These four cases offered every reason to fear an outbreak of eclampsia, and only after energetic treatment had been directed, without success, to the relief of the renal complication, was premature labor induced. This result emphasizes the value of the induction

of premature labor for the prevention of eclampsia. While the consensus of opinion may be said to favor such action, it is, nevertheless, true that some eminent authors fail to indorse operative interference.

The safest, simplest, and consequently, at present, the best method of exciting uterine contraction is the insertion of a bougie between the membranes and the uterine wall. The term catheterization, which is often employed to signify this method, should be discontinued, as the catheter is an unsuitable instrument to use for the purpose. Being hollow, with a hole at both ends, it is easily soiled and with difficulty cleaned. Even if aseptic when used, secretions accumulate within the tube and readily undergo decomposition. The bougie should be prepared by soaking for twenty-four hours in bichloride of mercury solution 1 to 1000, and then washing in boiled water just before use.

I prefer to insert it by exposing the parts with Sims's speculum, and steadying the cervix with the aid of a tenaculum. The end of the bougie is bent at an obtuse angle, and guided around the curve of the lower uterine segment. A boricated cotton tampon is placed in the vagina to prevent slipping of the bougie and to absorb the discharges.

If this treatment fail to excite uterine action, the instrument can be removed and a fresh one inserted in a different direction. The majority of cases will meet with success, but occasionally the organ is provoked to contract with great difficulty. Other means, familiar to all, can be resorted to for the purpose of exciting action.

A method recently suggested by Schräder is worthy of trial. It is the alternate application of hot and ice-cold fomentations to the abdomen, changes being made every five minutes. Lomer* has reported a case in which he succeeded in inducing labor by this means for impaired vision resulting from albuminuria. Pain developed in two hours, and in six the child was born.

Full doses of quinine and hot vaginal douches are useful to strengthen uterine pains after they have been started by other means.

Agents to soothe the nervous system and deaden sensibility are valuable during labor to diminish the liability to convulsions. The best of these are morphine hypodermically, chloral by the rectum, and the inhalation of chloroform. Morphine should not be employed too early, as it might arrest uterine action. Chloroform, given only to the obstetrical degree, meets the indication and aids the dilatation of the os. When dilatation progresses slowly, the early application of forceps, as advocated by the late Isaac Taylor, is a justifiable procedure. If labor-pains are strong and no delay arises, the completion of labor should be left to nature.

If, in any case, operative interference be demanded, chloroform should be the anæsthetic employed. Ether will increase the renal congestion, and might precipitate what we have used all our efforts to avoid.

In conclusion, it may be well to suggest one other precaution to be taken in these cases. The impaired function of the kidneys increases greatly the dangers of using corrosive sublimate and carbolic acid solutions for vaginal or intrauterine irrigation.

* *Centralblatt f. Gynäk.*, No. 43, 1890.

AN ABDOMINAL WICK—A NEW FORM OF DRAINAGE APPARATUS.†

By Robert T. Morris, M.D., New York.

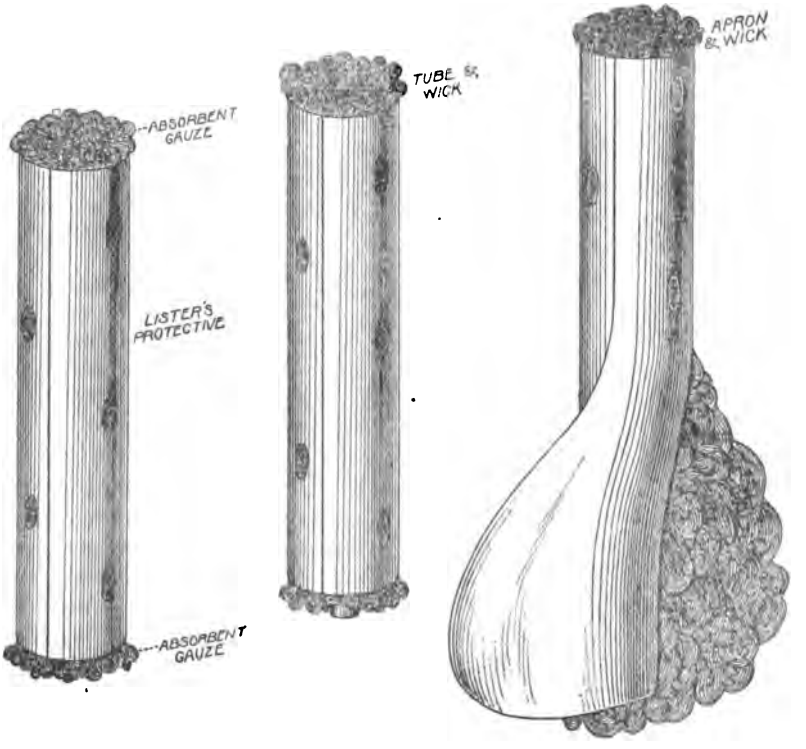
IN my first sixty-three laparotomy cases dependence had been placed upon a drainage-tube that was so efficient, so ready at hand, and so simple in its workings, that I thought it good enough to be patented. That drainage-tube was the patient's intestine, running through the middle of the great lymph-bag of the abdomen, and ready to abstract from the sac any collection of fluid that was enticing to microbes, and to set it out of doors, where their fatal breath would be exhaled into valueless space as they fought for possession of the spoils. Deliquescent salts passed through the alimentary canal or injected into my drainage-tube by way of the anus had cleared the great lymph-sac by osmosis so regularly and with such ease that any other sort of tube seemed to be a superfluity.

But one day this fine drainage-tube failed. The case may be spoken of unpoetically as "number sixty-four," in order to avoid the identity that goes with initials. There had been a moderate degree of oozing from adhesions after the removal of her large ovarian cyst, but this was not disturbing to my assistants at the hospital, who had often man-

† Read at the meeting of the American Medical Association, Washington, D. C., May, 1891.

aged similar cases without a ruffle of anxiety as to the outcome. This patient's bowels, however, failed to respond to the Seidlitz powder on the following day. Then a large dose of Rochelle salt was given without effect. The patient was steadily developing a septic peritonitis, and continued attempts at getting an evacuation from the bowels by means of Rochelle salt by mouth and by rectum were failures. Finally, I opened the abdominal cavity, and out ran a thin, wicked, stinking fluid, that had caused all the mischief, but it was too late, and the patient gradually failed and died. Her family and her physician had put confidence in me, and that was what I had done for them. An artificial drainage-tube introduced at the time of the operation, or at the beginning of the peritonitis, would probably have saved the patient's life, and I should have been spared remorse; but if one could have all experience at once, it would not be necessary to go to the bottom of such a dark well for truth. I could not believe in time that the patient's bowels were not going to act, as other bowels had done under similar circumstances.

My reasons for not using artificial drainage-tubes after abdominal operations had been good ones. I had known of several fæcal fistulæ that had followed the use of hard tubes, and secondary infection can easily take place through the straight and narrow way that leads to destruction. Soft tubes collapse. Gauze used for abdominal drainage may become so firmly adherent to the intestines that its removal means peril for the patient. Then, again, I knew that the introduction of artificial drainage-tubes meant a good deal of extra trouble for the surgeon. Of course, no one cares how much extra labor and trouble he is put to, if he can thereby save life and prevent suffering, but it seemed unnecessary, judging from my facts in experience up to the time of losing the patient just referred to. Since that time I have occasionally thought it prudent to use artificial drainage apparatus; and, to avoid the dangers of hard and soft tubes and of unprotected gauze, wicks were used. The simplest wick consists of a little roll of absorbent bichloride gauze, around which is wrapped a couple of thicknesses of Lister's protective oiled silk. The gauze protrudes a trifle from each end of the cylinder, and a few little holes snipped through the protective allow serum to reach the gauze elsewhere. In certain cases, where injections through a tube are desirable, the soft rubber tube can be surrounded with this wick. When a large gauze packing for the pelvis is needed, an apron of the silk can expand out over the gauze and protect against intestinal adhe-



sions. The wick acts by capillary attraction; the silk wrap will not irritate the peritoneum, and the whole thing is so soft that it adapts itself to curves readily, and I doubt if it will cause fæcal fistulæ. The end of the wick, which projects at the external opening of the wound, should be covered with enough absorbent cotton or gauze to hold all fluid that is coming from below. If a row of these wicks is introduced into a pan filled with water, they empty the pan in a few moments by siphon action, and they would empty it almost as quickly if each one led up into a bunch of absorbent cotton or gauze. A little wick as big as a lead-pencil will take pints of fluid out of the abdominal cavity and transfer it to the absorbent medium outside. When the wick is at work it is important for the patient to remain upon her back, for if the intestines are not inflated with gas, the fluid rises naturally to the anterior abdominal wall, instead of settling, as many surgeons suppose, in the region of Douglas's pouch. If the patient turn upon her side, the fluid, rising to the highest point, will be out of reach of the wick. The relative positions of peritoneal exudation or of blood serum and intestines will vary with the amount of gas in the intestines, but ordinarily immediately after work upon abdominal contents it may be observed that all free fluid is rising towards the anterior abdominal wall, and that is why the little holes are snipped through the silk of the wick at various points.

My drainage-tube No. 1 is still the intestine.

My drainage-tube No. 2 is the wick, and a row of wicks at work in a pan of water will speak more forcibly than I can.

133 West Thirty-fourth Street.

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*PROFESSOR KOCH'S METHOD, AND THE RESULTS OF ITS APPLICATION IN TWENTY-FIVE CASES OF PULMONARY AND LARYNGEAL TUBERCULOSIS.**

By Karl von Ruck, B.S., M.D.,† Asheville, N. C.

THE world-wide excitement which followed the announcement of a specific remedy for the cure of tuberculosis, by so eminent an authority as Professor Robert Koch, has now subsided.

The extravagant expectations then raised far exceeded those which Professor Koch's memorable paper justified us in entertaining, and the degree of credulity which heralded the first few months of clinical use of the tuberculin has probably never been exceeded in the history of scientific medicine, although similar experiences have attended other real or imaginary discoveries.

For a time it seemed as if the profession was confidently expected to deal successfully with tuberculosis by giving trial injections to every even remotely suspicious case, and, if the classical reaction of Koch followed, to simply continue the injections, in as large and as frequently-repeated doses as possible, until the case would be what may be called "lymph-proof," when, of necessity, the patient would have arrived at recovery. A typical reaction failing to follow an injection of 10 milligrammes, it would, on the other hand, be unquestionable evidence to the operator that, whatever might be the matter with the patient, he certainly was not tubercular; and it followed that all our previous means for diagnosis, as well as other methods of treatment, would be dispensed with, and climatic resorts and special institutions for consumptives had outlived their period of usefulness.

After fondly hoping for all these beautiful results, and calculating how much the average duration of human life would thereby be increased, we find ourselves, six months later, realizing that the impossible is not going to happen after all.

The early enthusiasm is changed to an equal degree of doubt, disappointment, and agnosticism, so that to-day the remedy has lost its popularity certainly with a majority of the public, and, if I judge rightly, also with a large number of the profession; and the physician who would be popular must now cry out against it as loudly as he applauded the tuberculin when first introduced, although he may not have had any personal experience whatever in its practical application.

If a practitioner has applied the remedy in a limited number of cases, and only for a short period of time, possibly upon entirely unsuitable and hopelessly-advanced patients, or upon an erroneous theory of its action, with improper dosage, his adverse experience is now eagerly heralded as demonstrating the uselessness or danger of it; and it certainly is

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unfortunate that the scientific and experimental inquiry into the value of the remedy upon the human subject could not have been fully completed before its announcement to the world. Instead of which its clinical application had to become an experiment with every one who thus far obtained it; whereby the necessarily conflicting reports and opinions, by so many different experimenters, remove the time when the true position of its value shall have been established into the distant future.

All that now remains for a solution of the question of its curative influence and range of applicability is to submit in evidence carefully-observed and fully-recorded cases treated, and the representatives of an enlightened and progressive profession on this side of the Atlantic, unbiased alike by national pride or national prejudice, seem to me to constitute a peculiarly safe and competent jury.

Towards this evidence I desire to contribute a moderate share in the full records of cases treated by me during four months or more, and which accompany this paper, representing, with minute data, the true condition of the patients both at the beginning of the treatment and at the time when this paper was prepared.

Inasmuch as my limited time will not allow the reading of the details of these cases, I can only present the general results; but, before doing so, I desire to say something of my experience and of my views on the action of the remedy, which governed me in my dosage, as in this I have materially departed from the teachings of Koch and the Berlin authorities.

During my study of the subject in Berlin I became quickly convinced, and then and since expressed my belief that the serious nutritive disturbances attending the application of the remedy, as I saw it there, justified the gravest apprehensions as to the final outcome of the treatment, especially in cases already considerably reduced, which form the great majority of applicants.

One who has seen much of pulmonary tuberculosis could not but have misgivings as to the ultimate fate of patients, who, already seriously ill, were made more so by frequent injections, increased as was deemed prudent, without, in fact, dealing the death-blow, and then often requiring the application of powerful stimulants to tide them over a severe general reaction; while, even with these alleviations, fatalities, directly attributable to the remedy, were not altogether avoided.

The weighing of a number of patients, which I witnessed in several institutions in Berlin, showed an almost uniform loss, even to five or six pounds in so short a time as a week, especially in the beginning of the treatment.

The sputum in the expectoration-glasses looked suspiciously bloody in so many cases that it could not be accidental with patients, who were entirely confined to bed. More severe hemorrhages also coincided with the lymph treatment. The temperature remained at times permanently elevated, or a distinct hectic curve seemed to have replaced a comparatively normal or slight febrile temperature.

Although good, indeed brilliant, effects, standing in presumably reasonable relation to the treatment, were also shown, these cases were not so frequently seen as to give grounds for the enthusiasm previously alluded to.

In this and other countries, as far as I know, the mode of application of the remedy was almost with pedantic exactitude, in conformity with the mode of application in Berlin, and it is only since the beginning of March that the physicians in Germany conceded, what I suggested as early as December, that general reactions should be avoided, for which purpose their dosage and increase is now even more conservative than I find to be necessary.

However, I soon learned to avoid febrile reactions altogether, and found that local reactions can often be demonstrated by physical examinations of the chest and larynx, when the patient is not aware of any change in his condition whatever. They may be said to consist in an increase of the local phenomena, or subjective symptoms, or both, which, of course, must have been fully recorded before the injection, and especially before and after each increase of dose.

To find them, a patient may have to be examined several times in the course of the day, and I have seen them appear and pass away in the course of so short a time as an hour. They may or may not be accompanied by temporary increase of cough, expectoration, drowsiness, sensation of soreness or slight oppression in the chest, swelling and tenderness of accessible glands, diarrhœal stools in intestinal complications, etc.

It seems to me impossible to administer the remedy with safety without being constantly upon the alert for local reaction, and, if the symptoms accompanying them are well

marked, the next dose must again be taken smaller, after several days of intermission.

These so-called "local reactions," their intensity and duration, became my guide in dosage, and I have learned to so administer the remedy as to cause no material discomfort to my patients. Neither has a single one lost in weight under the avoidance of general reactions; whereas a loss of several pounds was noted to attend them, in almost every instance of their occurrence, during my early experience.

The error in dosage probably had its origin with Professor Koch himself, who, seeing the great tolerance in the guinea-pig and other animals, naturally desired to increase the comparatively small doses which tubercular patients seemed to respond to, so as to approximate as near and as soon as possible the quantity administered by him in his experiments and under which he observed curative effects.

Seeing my patients improving more when febrile reactions were avoided, it became my rule never to begin with more than ½ milligramme, and to repeat the same dose until the patient seemed to have responded in no way whatever to either of the last two doses.

After 5 milligrammes have been reached, I find I can increase by one milligramme, and after 10, by two or two and one-half milligrammes, but only under the precaution that the last two doses shall have been apparently inoperative. Intervals of two or three days are allowed in every case between the injections.

In the mean while, Professor Virchow has shown us by the reports of his post-mortem findings that the remedy is one whose application may be attended with the gravest dangers; that while it may cause, as Koch has stated, necrosis of tubercular tissue, such necrotic processes may form the starting-points of extensive pneumonias, and that in the sloughing of tubercular tissue the dangers of general infection are increased, general miliary tuberculosis having frequently developed under the use of the remedy. He also showed that the tuberculin seemed to have no influence upon the miliary tubercle, and frequently not upon such as were old and encapsuled by fibroid tissue.

On the other hand, Virchow himself and other pathologists have also demonstrated the recent healing and reparative tendencies of internal tubercular lesions under its use, from all of which I more than ever feel justified in concluding that, in some of the reported indifferent or bad results, the fault was not so much with the remedy as with overdosage.

After knowing the lymph to be the product of the tubercle bacillus, and having demonstrated its irritative effect upon tubercular lesions, it is not difficult to see that, other things being equal, the effect must be in proportion to the dose, a small dose producing slight irritation, increase of the circulation, and transmission of leucocytes to the part, together with increased nutrition of the fixed tissue-cells, and their proliferation; but an excessive dose may exceed the production of irritation, and favor the occurrence of inflammation, suppuration, and excavation, precisely what happened so frequently under the rapid increase of doses, accompanied by the so-called "general reaction," which latter are the same and identical with the symptoms of softening and excavation when occurring in the ordinary course of disease.

By the judicious administration of the tuberculin, we can, under such a theory, hope to augment nature's efforts at an early period or at a favorable time, without incurring the dangers attending the processes of softening and formation of cavities. The specific effect upon tubercular tissue is also explained by the additional action of a similar product introduced artificially to that already produced within the tubercular lesion and acting upon its periphery. The encapsuling, pressure-atrophy, and absorption of tubercular tissue have apparently occurred, independent of Koch's remedy, under nature's adaptation of the similar bacteriological product generated by the tubercle bacilli within the organism, and it is probable that the inflammatory, suppurating, softening, or necrotic processes, which are nature's less desirable curative efforts, owe their occurrence to an overproduction of the same substance.

As to the inefficiency of the remedy upon miliary tubercle, and such as are old and located in or surrounded by cicatricial tissue, the vascularity of the parts will probably furnish the explanation. There can only be "a plus" of the specific bacteriological product, after a similar product has been formed within the tubercle, and, by reaching the periphery, has set up irritation. Therefore the remedy from without cannot exert any influence whatever until vascularization of the tubercle has occurred. Tubercular tissue, more or less encapsuled, can, of course, only be affected when larger doses are adminis-

tered, as there, on account of obliteration of capillaries, the limited blood-supply to the periphery, can admit but little of the remedy from without before it is eliminated.

In now recurring to the results obtained in my cases, I must state that the treatment was carried out under climatic conditions heretofore well known for their beneficial influence upon pulmonary tuberculosis, and in a special institution, where not only a rational employment of the climate is insisted upon, but where all other means find application which are known to exert a favorable influence or aid in the prevention of relapses in the course of the disease. Especial attention was paid to the hygienic and dietetic management, and to the avoidance of physical overexertion.

In a number of cases the pneumatic cabinet was used for special purposes, as, for instance, for the facilitating of expectoration, the favoring of a better local and general circulation, the increasing of the vital capacity, the strengthening of the respiratory muscles and the expiratory force.

Of these 515 cases, were reported as—

Apparently recovered.....	59
Greatly improved.....	65
Improved (subsequently relapsed)...	67
Slightly improved (and relapsed)....	157

Leaving out the slightly-improved cases, we have 191 cases out of 515, the good results in 124 of which have lasted, in a majority, for a number of years; and, in estimating the results which I obtained under the lymph, it is quite as rational to suppose that in some cases relapses will occur in the future as to assume that still further improvement will attend our efforts.

Furthermore, I must say that the results I have obtained in individual cases present nothing peculiar or different from those in my previous experience, with, perhaps, the exception of the apparently more prompt diminution of cough and expectoration, and disappearance of moist auscultatory phenomena. The influence of the treatment upon the expectoration is shown by the following table, prepared from the records of our laboratory:

Table showing the Influence of Tuberculin upon the Expectoration in Pulmonary Tuberculosis.

Case number.	Day before injection.		Day of injection.		Day after injection.		Second day after injection.		Third day after injection.	
	Sputum, quantity in grammes.	Per cent. solid matter.	Sputum, quantity in grammes.	Per cent. solid matter.	Sputum, quantity in grammes.	Per cent. solid matter.	Sputum, quantity in grammes.	Per cent. solid matter.	Sputum, quantity in grammes.	Per cent. solid matter.
1.....	22.3	5.0	31.0	4.8	61.0	5.3	26 3	4.2	18.7	4.4
2.....	36.2	3.9	37.6	4.3	45.5	5.8	30.0	4.0	31.0	4.0
3.....	1.8	0.2	2.4	0.15	3.8	0.18	0.0	0.0	0.0	0.0
4.....	27.2	15.5	53.5	7.3	61.9	8.5	60.0	8.1	30.2	10.2
5.....	111.5	4.7	121.8	5.1	139.3	7.0	126.0	3.2	77.2	4.2
6.....	42.8	2 8	55.7	4.0	87.3	7.8	40.0	3.5	24.3	1.2
Totals.....	241.8	32.1	302.0	25.65	398.8	34.58	282.3	23.0	181.4	24.0
Average...	40.3	5.35	50.3	4.27	66.46	5.76	47.5	3.8	30.2	4.0

Obstructive nasal disease was always removed to a degree to insure free nasal respiration; in short, nothing was left undone which in any way was necessary for the accomplishment of the highest degree of nutrition in the widest sense; and, under the same climatic conditions and management, my previous results, without specific medication, have been by no means indifferent.

I reported 515 cases in the *Medical News* of May 13, 1890, a comparison of the results in which may aid you in your judgment as to the benefit, if any, I may have derived from the method of Professor Koch.

Showing an average quantity of sputum of forty grammes, with five and one-third per cent. solid matter, for the twenty-four hours preceding the injection. On the day of the injection the quantity increased to fifty grammes, while the per cent. of solid matter is diminished. On the first day after the injection the sputum increased to 66.5 grammes, with nearly six per cent. of solid matter. On the second and third days following, the quantity and per cent. of solid matter fell below the amount of the day preceding the use of the remedy. Results of observation on this point are similar to any other like num-

ber of cases and upon different periods of their treatment.

The daily tracing of the pulse-rate of patients under treatment with tuberculin also shows a condition, which, I believe, is due to the remedy.

I find that, especially in the earlier part of its administration, the heart-action is much more readily excited by causes which before were inoperative. This increased irritability of the heart is lost as the treatment is continued, but in some patients it continued to appear regularly on the day of, or the day following, the injection. Much caution was, therefore, required in the amount of physical and mental exertion allowable when applying the remedy.

We have also noted a marked increase in the urinary secretions, occurring within twenty-four hours after an injection, and lasting from a part of a day to as long as forty-eight hours. I never noticed albuminuria or the occurrence of casts.

I do not consider that the noticeable increase in weight is to be directly referred to the use of Koch's remedy. We have had equally good improvement in the nutrition of our patients heretofore, and I then, as I do now, ascribed this to the diet and general management which I carry out in my institution.

The same is true as to the increase in vital capacity, and the patients which show a considerable gain are those who have used the pneumatic treatment in addition.

On the other hand, while the same climatic conditions obtained in my patients who used the lymph and those whom I treated in Asheville heretofore, I must admit that the weather during two of the months the lymph cases were under treatment was less favorable than during any of my previous experience in Asheville; and that, on the whole, I have the impression that the improvement of the cases under Koch's method was more prompt and uniform than in my past experience. I incline to this belief the more, inasmuch as I have had a number of patients in my institution during the same period, and, apart from the use of Koch's method, under the same identical conditions, diet, and general management, whose improvement is not as uniform and satisfactory.

The twenty-five cases of pulmonary tuberculosis treated with Koch's remedy are, for convenience, divided into three classes, according to the degree of the local disease, and more particularly the degree of the general health and vigor of the patient.

Class A comprises five cases, with one or both upper lobes involved, but without destructive changes, the general health being still comparatively good. Of these, are—

Apparently recovered	3
Greatly improved	1
Improved	1

The greatly-improved case has been under treatment only a little over a month, and there exist the best prospects for his future improvement and final recovery.

The case reported as "improved" left the institution after three weeks' treatment to pursue it elsewhere, and her prospects seemed very good indeed.

Four patients gained in weight from two to twenty-seven pounds, an average of twelve pounds each. In one case the weight was not recorded.

Class B comprises seven cases, with more extensive disease or moderate destructive processes, which were still in a fair physical condition.

Of these, are—

Apparently recovered	4
Greatly improved	2
Improved	1

All these cases bid fair to continue in their improvement, and in most of the unfinished cases arrestment of their disease seems quite probable to follow further efforts.

Five of these gained in flesh from four to twenty-three pounds, with an average of ten pounds each, there being no change in weight in two cases.

Class C comprises thirteen cases far advanced in local disease, with considerable constitutional impairment, but still a condition that there was some hope for improvement. Of these, are—

Greatly improved	4
Improved	6
Slightly improved	1
Not improved	2

The cases "not improved" and the "slightly improved" case have been put upon other methods of treatment, after what I considered a fair trial of the Koch method; the slightly-improved case has made good progress since.

Nine of these patients gained from one to twelve and one-half pounds, an average of six and one-third pounds each.

Three cases neither lost nor gained; another lost nine pounds and has regained four

pounds, being deficient five pounds, but is now gaining.

Among these twenty-five cases were six who suffered also from tubercular laryngitis, two of which presented moderate circumscribed infiltrations, and have entirely recovered, in the sense that the larynx now appears normal, the voice is good, there are no subjective symptoms, and no further local reactions occur to the comparatively large doses of the lymph.

Another and similar case is improving.

The remaining three cases, all far advanced, both in the pulmonary and laryngeal disease, are those in which the method was discontinued, no material improvement in the laryngeal affection having been obtained.

The laryngeal symptoms were subsequently improved under other treatment.

For its diagnostic value I have had occasion to apply the remedy only once,—in Case IX. A general and local reaction occurred to a trial dose of .0025, and the sputum, which had been frequently examined with negative results, contained tubercle bacilli in considerable numbers on the following day.

In another case (VII.), where we previously failed to find them, bacilli appeared in the sputum after the first injection of .001. Both were early-stage cases. The histories, together with the local symptoms, were, however, quite sufficient to establish the diagnosis, and in Case IX. the trial injection was really not necessary.

With the accumulating evidence that general reactions are injurious, and that the doses required to produce them may be dangerous, at least in cases of pulmonary tuberculosis, it is my intention not to again employ the remedy for diagnosis, except in cases where tuberculosis is to be excluded, rather than for the purpose of confirming its existence.

This, gentlemen, is a short summary of the results which I submit to your consideration and judgment, without further comment than to say—

First. That according to my experience with the patient under constant medical supervision, and under the precautions used, the remedy CAN be given with the avoidance of all unpleasant symptoms or danger.

Second. That while I believe that I have derived material benefit, the experience of many additional observers, under a similar mode of management and administration to that adopted by myself, is required to establish the exact value and range of applicability of the remedy; and,

Third. That the combined means by which my results were obtained appear to deserve the favorable consideration of the profession.

CASES.

CASE I.—Miss S. S., aged 26; pulmonary and laryngeal tuberculosis. (Class C.)

History of hereditary predisposition. Duration of illness, four years; slow course until recently; aphonic eighteen months; weight in health, 136 pounds.

Present Condition.—Lungs.—Involvement of entire left and upper lobe of right. Fine râles right apex anterior, harsh and prolonged expiration; large râles mask respiratory sounds left upper lobe in front and back. Indeterminate respiration in left lower lobe.

Larynx.—General infiltration and swelling of all the structures, cords sausage-like, immobile, almost approximated (stenosis), painful deglutition, ulcerated epiglottis.

General.—Appetite poor, sleep restless, cough frequent, expectoration two ounces. Temperature 97.2° to 101°, pulse 108 to 120, respiration 22 to 30; vital capacity, 85 cubic inches; weight, 109 pounds.

Microscopical.—Elastic tissue, tubercle bacilli, Gaffky's scale, 10; well defined.

Treatment.—Koch's method from December 24 to March 11, 1891. Beginning dose, .0003; maximum dose, .004; in twenty-one injections; total quantity, .056 gramme.

Effects.—Always local reactions in larynx, frequently in lungs, general reaction to .0003 twice; expectoration increased first, then diminished; frequently better sleep; several times nausea.

Result.—Examination March 11, 1891.

Lungs.—Fine catarrhal râles on right side disappeared, cavity formed in left upper lobe and now dry, râles there diminished, respiration bronchial; lower left lobe unchanged.

Larynx.—No material change.

General—Better sleep, better appetite, less cough, expectoration two drachms. Temperature 98° to 100°, pulse 100 to 105, respiration 20 to 24; vital capacity, 93 cubic inches; weight increased from 109 to 110 pounds, a gain of one pound.

Microscopical.—Elastic tissue, bacilli diminished to Gaffky's scale, 3.

Patient's Statement.—"Thinks she was benefited."

Classed as—Slightly improved.

Upon other method of treatment and improving.

CASE II.—Mr. W. S., aged 20; pulmonary tuberculosis. (Class B.)

No hereditary history. Duration of illness, one year. History of frequent hemorrhages; weight in health, 142 pounds.

Present Condition.—Examination December 28, 1890.

Lungs.—Infiltration right upper lobe, bronchial respiration, cavity below right clavicle, few râles. Left side infiltration of upper lobe, small cavity in apex, fine râles anterior and posterior to seventh rib.

General.—Appetite fair, sleep good, cough moderate, expectoration two to three ounces. Temperature normal, pulse 100, respiration 20; vital capacity, 180 cubic inches; weight, 142 pounds.

Microscopical.—Sputum purulent, elastic tissue, tubercle bacilli, Gaffky's scale, 6.

Treatment.—Koch's method from December 29 to April 11. Beginning dose, .001; maximum dose, .05; fifty-one injections; total quantity, 1.111 grammes.

Effects.—One general reaction after .003; frequent local reactions; cough and expectoration first increased, then diminished; lost two pounds of flesh from general reaction.

Result.—Examination April 11, 1891.

Lungs.—Percussion-note better, signs of cavity fail on both sides since about a month ago, all moist sounds gone, respiration faintly vesicular in both upper lobes, normal in lower lobes, both apices depressed, shrinking.

General.—Appetite very good, sleep good, cough much diminished, only a little in the morning, expectoration mucous, about one drachm. Temperature normal, pulse 72, respiration 20; vital capacity, 220 cubic inches; weight, 155 pounds, a gain of thirteen pounds.

Microscopical.—Bacilli absent for over a month; recently no more sputum.

Patient's Statement.—"Feels entirely well; never felt better in his life."

Classed as—Apparently recovered.

Still under observation.

CASE III.—Miss E., aged 20; pulmonary tuberculosis. (Class A.)

Hereditary predisposition; illness one year; weight in health, 140 pounds.

Present Condition.—Lungs.—Infiltration in left upper lobe.

General.—Appetite good, sleep good, cough slight, expectoration about one drachm. Temperature 100°, pulse 95, respiration 22; vital capacity, 145 cubic inches; weight, no record.

Microscopical.—Tubercle bacilli, Gaffky's scale, 9.

Treatment.—Koch's method from January 1 to January 21. Beginning dose, .001; maximum dose, .008; in nine injections; quantity of lymph used, .043 gramme.

Effects.—One slight general reaction to .001; subsequently local reactions in lung to .002, .004, and .005 milligramme, with increased expectoration each time.

Result.—Lungs.—Clearing up of percussion-note, and more vesicular character of respiration.

General.—Condition the same, cough disappeared, sputum mucous. Temperature normal, pulse 80 to 96, respiration 20; vital capacity, 150 cubic inches; weight increased (no exact record).

Microscopical.—Bacilli, Gaffky's scale, 2.

Patient's Statement.—Better as regards cough and expectoration, better sleep, less oppression in breathing.

Patient left institution to continue the treatment elsewhere.

Classed as—Improved.

CASE IV.—Mrs. B. E., aged 24; pulmonary and laryngeal tuberculosis. (Class C.)

History of hereditary predisposition. Duration of illness, eighteen months; weight in health, 136 to 140 pounds.

Present Condition.—Lungs.—Excavation and râles of upper, and infiltration of lower, left lobes, with pleuritic thickening; slight infiltration apex of right lung.

Larynx.—Infiltration and swelling of arytenoids and posterior commissure.

General.—Appetite good, sleep good, cough moderate, expectoration one and one-half ounces. Temperature 98° to 100°, pulse 96 to 112, respiration 24; vital capacity, 120 cubic inches; weight, 127 pounds.

Microscopical.—No elastic tissue, tubercle bacilli Gaffky's scale, 10; well defined.

Treatment.—Koch's method from January 1 to April 15. Beginning dose, .0005; maximum dose, .012; number of injections, 37; quantity of lymph used, .170 gramme.

Effects.—Local reactions in larynx up to 4 milligrammes; severe general reaction on .003, with pleuritic symptoms, and increased consolidation in left lower lobe; afterwards local reactions and subjective symptoms to .002. Cough and expectoration and bacilli increased; later diminished; loss of flesh in early period of ten pounds; subsequent gain; no reaction, either local or general, after .004.

Result.—Examination April 15, 1891.

Lungs.—Cavity shrinking and dry, lower left lobe increased pleuritic thickening, fibroid shrinking, harsh and bronchial respiration, right upper lobe, also fibroid changes, shrinking.

Larynx.—Normal.

General.—Appetite good, sleep good, less cough, expectoration one-half ounce. Temperature normal, pulse 88 to 100, respiration 24; vital capacity, 100 cubic inches; weight, 122 pounds.

Microscopical.—No elastic tissue, sputum mucous, bacilli diminished to Gaffky's scale, 1.

Patient's Statement.—"Grew worse first; afterwards much better."

Classed as—Laryngeal disease cured; otherwise improved.

Still under treatment.

CASE V.—F. L. C., aged 32; pulmonary and laryngeal tuberculosis. (Class C.)

No history of predisposition. Illness dates back one year, and followed attack of epidemic influenza; weight in health, 124 pounds; aphonic several months.

Present Condition.—Lungs.—Large cavity involves the upper lobe and upper portion of lower left lobe; râles throughout left lung; infiltration and crepitation in right upper and middle lobes; lower lobe clear.

Larynx.—Both arytenoid cartilages infiltrated and swollen, also posterior commissure; there, proliferating mass, ulceration posterior wall of trachea, epiglottis not involved, cords thickened, swollen, and both ulcerated.

Microscopical.—Elastic tissue, tubercle bacilli, Gaffky's scale, 7.

General.—Appetite poor, sleep restless, night-sweats, cough severe, expectoration three ounces. Temperature 105.5°, pulse 120, respiration 30; vital capacity, 120 cubic inches; weight, 114 pounds; weak and anæmic.

Treatment.—Koch's method from January 6 to February 24. Beginning dose, .0005; maximum dose, .003; total, .044 gramme; number of injections, 19.

Effects.—No general, but frequently local, reactions, both in larynx and lungs, attended with pain and sensation of pressure; increased cough and expectoration; upon several injections diarrhœal stools.

Result.—Lungs.—In the upper right lobe the percussion-note is, perhaps, a little better, the respiration has changed from a harsh to a more vesicular character, crepitation is absent, râles on left side slightly less.

Larynx.—No material improvement.

Microscopical.—Sputum muco-gelatinous, bacilli, Gaffky's scale, 4.

General.—Appetite somewhat improved, sleeps better, night-sweats less frequent, cough same, expectora-

tion diminished one ounce. Temperature 98° to 102°, pulse 90 to 110, respiration 26; vital capacity, 115 cubic inches; weight same; anæmia same.

Patient's Statement.—Improved first; then throat got worse; thinks he feels stronger.

Koch's method stopped; lactic acid to larynx is followed by improvement.

Classed as—Not improved.

CASE VI.—A. G. B., aged 37; pulmonary and laryngeal tuberculosis. (Class C.)

No hereditary history. Duration of illness, three years; weight in health, 116 pounds; aphonic since eight months.

Present Condition.—Lungs.—Infiltration, both upper and upper part of left lower lobes, fine râles in right, coarse râles throughout left, gurgling below left clavicle.

Larynx.—General infiltration and swelling of all structures as far as visible; ulceration upon epiglottis.

General.—Appetite fair, deglutition painful, sleep disturbed by cough, expectoration four ounces. Temperature 100.5°, pulse 120, respiration 27; vital capacity, 85 cubic inches; weight, 103 pounds.

Microscopical.—Sputum muco-purulent, bacilli, Gaffky's scale, 2; no elastic tissue.

Treatment.—Koch's method from January 6 to February 23, 1891. Beginning dose, .0003; maximum dose, .003; eighteen injections; quantity used, .035 milligramme.

Effects.—Local reactions in larynx, and several times in lungs.

Result.—Examination February 27, 1891.

Lungs.—No change, except slight diminution of râles.

Larynx.—At first swelling and painful deglutition slightly improved, afterwards relapse.

General.—First improvement, afterwards relapse (relapse occurred in connection with an attack of influenza), expectoration increased. Temperature 100° to 102°, pulse 112 to 120, respiration 24; vital capacity, 85 cubic inches; weight, 104 pounds.

Microscopical.—No change.

Patient's Statement.—Improved until influenza, then relapsed.

Treatment by Koch's method abandoned on account of increased fever and protracted increase of swelling of larynx after attack of influenza.

Classed as—Not improved.

CASE VII.—Miss M. P., aged 24; pulmonary tuberculosis. (Class A.)

History of predisposition. Duration of illness, nine months; weight in health, 100 pounds.

Present Condition.—Examination January 9, 1891.

Lungs.—Relative short percussion-note and fine catarrhal râles in both apices.

General.—Indigestion for some years, sleep good, cough slight, expectoration absent. Temperature normal, pulse 96, respiration 20; vital capacity, 130 cubic inches; weight, 99 pounds; anæmic.

Microscopical.—No sputum.

Treatment.—Koch's method from January 9 to April 16. Beginning dose, .001; maximum dose, .025; thirty-nine injections; quantity of lymph, .334 gramme.

Effects.—Local reaction in the lung, bacilli in sputum after first injection, Gaffky's scale, 4.

Result.—Examination April 6, 1891.

Lungs.—Percussion-note shows better resonance; no râles or abnormal sounds; weak vesicular respiration in both apices.

General.—Appetite and digestion improved, cough and expectoration absent. Temperature, pulse, and respiration normal; weight, 101 pounds; anæmia improved.

Microscopical.—Sputum only occasional, a little mucous, no bacilli in last specimens, none now available for examination.

Patient's Statement.—Feels as well as she has done in years.

Still under observations, and receives further injections to make the result as permanent as possible.

Classed as—Apparently recovered.

CASE VIII.—Mr. A. K., aged 32; pulmonary tuberculosis. (Class B.)

Hereditary predisposition. Duration of illness, six years; weight in health, 155 pounds.

Present Condition.—Examination January 8, 1891.

Lungs.—Infiltration both upper, middle, and left lower lobes, small cavity in left, larger one in right apex, râles in both upper lobes, crepitation upon coughing in left lower posterior.

Microscopical.—Tubercle bacilli, Gaffky's scale, 8.

General.—Appetite fair, sleep disturbed by cough, cough frequent, expectoration muco-purulent, twenty drachms, weak, anæmic, night-sweats. Temperature 101°, pulse 90, respiration 24; vital capacity, 150 cubic inches; weight, 123 pounds.

Treatment.—Koch's method from January 6 to April 20. Beginning dose, .0005; maximum dose, .06; thirty-seven injections; total, .944.

Effects.—No general, but frequently local, reactions, with increased cough, increase and change in the character of the expectoration, later marked decrease.

Result.—Examination of lungs. No râles anywhere, percussion-note much better, cavernous symptoms absent on both sides, a weak but vesicular quality of respiration in both upper lobes, left lower lobe normal.

Microscopical.—Bacilli absent, no more sputum.

General.—Appetite good, sleep good, cough very little on rising, expectoration mucous, general condition much improved, anæmia subsided. Temperature normal, pulse 80, respiration 18; vital capacity, 205 cubic inches; weight, 146 pounds, a gain of twenty-three pounds; still gaining.

Patient's Statement.—Feels perfectly well.

Still under observation.

Classed as—Apparently recovered.

CASE IX.—Miss B., aged 27; pulmonary tuberculosis. (Class A.)

Hereditary predisposition. Hacking cough, one year; weight in health, 118 pounds; had typhoid fever in 1889; never been as well since; pneumonia, seven or eight years ago.

Present Condition.—Lungs.—Infiltration of right upper lobe, inspiration harsh and higher pitched, prolonged expiration, left upper lobe infiltration in apex and along sternal border to third rib.

Larynx.—Slightly congested.

General.—Appetite fair, sleep good, cough moderate, expectoration slight, mucous. Temperature 100°, pulse 90, respiration 20; vital capacity, 120 cubic inches; weight, 116 pounds; expectoration mucous, no bacilli. Trial injection by Koch's method, general and local reaction to .0025, bacilli, Gaffky's scale, 2, well defined in sputum the following day.

Treatment.—Koch's method from January 9 to April 16. Beginning dose, .0005; maximum dose, .05; forty-one injections; quantity of lymph used, .689 gramme.

Effects.—Local reaction in lungs frequently, none to .05 or since. No temperature elevation or subjective disturbance beyond the reaction to trial injection of .0025; lost two pounds of flesh then.

Result.—Examination April 16, 1891.

Lungs.—Percussion-note better, slightly harsh vesicular inspiration in right, normal in left upper, no râles, right apex slightly depressed.

Larynx.—Normal.

General.—Appetite very good, sleep good, no cough, no expectoration. Temperature normal, pulse 72 to 84, respiration 18; vital capacity, 185 cubic inches; weight, 127 pounds, a gain of eleven pounds.

Microscopical.—Last specimens of expectoration examined "mucus free from bacilli," no further expectoration available.

Patient's Statement.—Feels as well as she ever did.

Classed as—Apparently recovered.

Still under observation.

CASE X.—J. R., aged 51; pulmonary and laryngeal tuberculosis. (Class B.)

Hereditary predisposition. Duration of illness, six years; weight in health, 124 pounds.

Present Condition.—Examination January 11, 1891.

Lungs.—Infiltration of right upper lobe, cavity with large râles below clavicle, slighter infiltration apex of left side to fourth rib anterior, here harsh respiration and crepitation.

Larynx.—Infiltration of right arytenoid cartilage, and posterior commissure, husky voice, congested cords.

General.—Appetite fair, sleep disturbed by cough, expectoration two to three ounces, cough severe. Temperature 99.5°, pulse 96, respiration 24; vital capacity, 125 cubic inches; weight, 114 pounds; short of breath; easily tired.

Microscopical.—Tubercle bacilli, Gaffky's scale, 4.

Treatment.—Koch's method from January 11 to April 20, 1891. Beginning dose, .001; maximum dose, .03; thirty-five injections; total quantity of lymph used, .457 gramme.

Effects.—One general reaction to .0025, frequent local reactions in larynx and lungs, loss of two pounds in flesh upon general reaction.

Result.—Examination April 20, 1891.

Lungs.—Left lung entirely clear, distinct, although slightly diminished vesicular respiration in upper lobe, cavity cicatrized in right upper lobe, all râles gone, respiration still a little harsh but much improved, percussion note good.

Larynx.—Nothing abnormal; voice clear and strong.

Microscopical.—Bacilli broken, Gaffky's scale, 1, sometimes 0.

General.—Appetite good, sleep good, cough only once or twice on rising, expectoration very slight, frequently entirely mucous, better color and appearance, more vigorous, no shortness of breath. Temperature, pulse, and respiration normal; vital capacity, 160 cubic inches; weight, 119 pounds, and slowly gaining.

Patient's Statement.—Feels much better; has not been so free in his breathing for several years.

Still under treatment.

Classed as—Greatly improved.

CASE XI.—Mrs. G. S., aged 28; pulmonary tuberculosis. (Class B.)

History of predisposition. Several pneumonias in last two years; weight in health, 106 pounds; duration of present illness, one year.

Present Condition.—Examination January 6, 1891.

Lungs.—Infiltration of right upper lobe and left apex, small cavity below right clavicle, fine catarrhal râles right upper lobe, large râles and tinkling in cavity.

General.—Appetite poor, sleep fair, cough moderate, expectoration slight. Temperature 99°, pulse 90, respiration 19; vital capacity, 95 cubic inches; weight, 91 pounds; anæmic.

Microscopical.—Tubercle bacilli, Gaffky's scale, 8.

Treatment.—Koch's method from January 13 to April 14, 1891. Beginning dose, .0005; maximum dose, .025; in thirty-one injections; quantity, .173 gramme.

Effects.—Frequently local reactions in the lungs with increased cough and expectoration in early part of treatment, later decrease and entire subsidence.

Result.—Examination April 14, 1891.

Lungs.—Percussion-note improved, no sign of cavity, no râles or crepitation anywhere, respiration right side broncho-vesicular below clavicle, nothing abnormal elsewhere, no more cough or expectoration.

Microscopical.—Gradual diminution of bacilli to entire absence since March 12, no more sputum.

General.—Improvement up to early part of March; then, owing to the occurrence of pregnancy, entire aversion to food, constant nausea and frequent vomiting, which still continues. Weight, gain of three pounds to ninety-four, then loss of four pounds, now holds her own. Temperature, pulse, and respiration normal; vital capacity, 115 cubic inches; cough none, expectoration none.

Patient's Statement.—Feels entirely well as far as her lungs and cough are concerned.

Classed as—Apparently recovered.

Receives still occasional injections of lymph, without local or general reactions. Patient has since miscarried, and is now improving in her general health, no further reactions occur to the lymph.

CASE XII.—J. S. B., age 44; pulmonary tuberculosis. (Class C.)

Hereditary predisposition. Duration of illness, two years; weight, in health, 125 pounds.

Present Condition.—Examination January 20, 1891.

Lungs.—Excavation right upper lobe, cavity gurgling, small cavity in right middle lobe, with bubbling râles, lower lobe indeterminate respiration and pleuritic crepitation, left lung infiltrated throughout, percussion-note almost flat, râles throughout, pleuritic thickening.

Microscopical.—Elastic tissue, tubercle baccilli, Gaffky's scale, 5.

General.—Appetite indifferent, sleep disturbed by cough, has night sweats, general condition poor, weak and anæmic, cough moderate, expectoration two ounces, thick, purulent. Temperature 100°, pulse 108, respiration, 26; vital capacity, 108 cubic inches; weight, 118 pounds.

Treatment.—Koch's method from January 21 to April 20, thirty-six injections. Beginning dose, .0005; maximum dose, .018; total quantity, .295 milligramme.

Effects.—No general, frequently local, reactions, with changes in cough and expectoration, first increased, later diminished.

Result.—Examination April 20, 1891.

Lungs—Cavity right upper lobe dry and shrinking, the one in middle lobe cannot be demonstrated, no râles anywhere, better respiration, approaching a vesicular quality in left lung, where the percussion-note has cleared up very much.

Microscopical.—Tubercle bacilli, Gaffky's scale, 3, no elastic tissue.

General.—Appetite fair, sleep good, cough slight, at times absent for twenty-four hours, expectoration very slight, chiefly mucous, general appearance better. Temperature 99°, pulse 80, respiration 20; vital capacity, 110 cubic inches; weight, 118 pounds.

Patient's Statement.—"Feels better."

Classed as—Improved.

Still under treatment.

CASE XIII.—Miss H. C., age 28; pulmonary and laryngeal tuberculosis. (Class C.)

Hereditary predisposition. Duration of illness, three years; weight, in health, 140 pounds; history of tubercular peritonitis, two years ago; aphonic, two years.

Present Condition.—Lungs.—Infiltration entire left lung, cavity below clavicle, râles throughout, infiltration right upper lobe, with few râles.

Larynx.—General infiltration of entire larynx, stenosis, recently relieved by intralaryngeal operations, wounds well cicatrized.

Microscopical.—Tubercle bacilli, Gaffky's scale, 2.

General.—Appetite bad, sleeps only under morphine, cough frequent and violent, expectoration about one-half ounce, bowels obstinately constipated, anæmic, weak, unable to sit up. Temperature 99° to 100°, pulse 95 to 110, respiration 30; vital capacity, 70 cubic inches; weight, 94 pounds.

Treatment.—Koch's method from January 25 to April 20, twenty-four injections. Beginning dose, .0005; maximum dose, .004; total quantity, .04.

Effects.—No general, but frequently local, reactions, increase in cough and expectoration, pain in chest and bowels, six diarrhœal stools followed .003, and upon repetition of the same dose the same effect followed in a less degree, until after five further injections, no disturbance of bowels followed, local reactions in the larynx, bacilli increased to Gaffky's scale, 4, after .003.

Result.—Lungs.—Percussion-note much improved, respiratory sounds, especially on right side, of much more vesicular quantity, here crepitation now absent, râles generally diminished on left side.

Larynx.—No change.

Microscopical.—Bacilli absent for three weeks, no more sputum.

General.—Appetite indifferent, sleep better, with less morphine, cough much improved, expectoration none, stronger, able to walk out of doors, better color, bowels better. Temperature normal, pulse 80, respiration 24; vital capacity, 125 cubic inches; weight, 100 pounds.

Patient's Statement.—"Feels much better."

Classed as—Greatly improved.

Still under treatment.

CASE XIV.—F. N., aged 31; pulmonary tuberculosis. (Class C.)

Hereditary predisposition. Duration of illness, three years; weight, in health, 125 pounds.

Present Condition.—Lungs.—Excavation entire right upper lobe, with gurgling, infiltration of middle and lower lobes, with harsh inspiration and crepitation. Left upper, small cavity below clavicle, and supraspinous fossa, with bubbling râles and metallic tinkling, lower lobe infiltration, posterior, harsh inspiration, with crepitation.

General.—Appetite is poor, is losing flesh, sleep disturbed by cough, expectoration five ounces. Temperature 101°, pulse 120, respiration 32; vital capacity, 70 cubic inches; weight, 109 pounds; night-sweats frequent, very weak and anæmic.

Microscopical.—Sputum muco-purulent, elastic tissue, bacilli, Gaffky's scale, 9; well defined.

Treatment.—Koch's method from January 26 to April 12, 1891. Beginning dose, .0005; maximum dose, .007; thirty-one injections; quantity of lymph used, .106 gramme.

Effects.—Frequently local reactions, first increased cough and expectoration, now much diminished.

Result.—Examination April 12, 1891.

Lungs.—Right upper lobe shrinking and cavity dry, percussion-note in middle and lower lobe much improved, respiration softer, more vesicular, uncertain about small cavity in left upper lobe, only at times a faintly blowing sound, not for several weeks even that, lower lobe better quality of respiratory sounds, no râles anywhere.

Microscopical.—Tubercle bacilli gradually diminished to Gaffky's scale, 1 (broken).

General.—Appetite good, sleep good, cough much less, chiefly mornings, expectoration about one-half ounce. Temperature normal, pulse 88, respiration 20; vital capacity, 80 cubic inches; much improved in appearance, anæmia relieved, stronger; weight, 119 pounds.

Patient's Statement.—"Feels splendid."

Classed as—Greatly improved.

Still under treatment.

CASE XV.—Mrs. A. B. B., aged 30; pulmonary tuberculosis. (Class C.)

No hereditary predisposition. Duration of illness, about two years; weight, in health, 120 pounds.

Present Condition.—Examination January 24, 1891.

Lungs.—Infiltration and excavation in both upper lobes, infiltration upper part left lower lobes, gurgling in cavities, râles mask all respiratory sounds in upper lobes, anterior and posterior, crepitation and harsh inspiration left lower.

Microscopical.—Elastic tissue, tubercle bacilli, Gaffky's scale, 9.

General.—Appetite poor, sleep bad, cough severe, expectoration five ounces, heavy, purulent. Temperature 102°, pulse 120, respiration 30; very weak, anæmic; vital capacity, 77 cubic inches; weight, 96 (losing).

Treatment.—Koch's method from February 2 to April 20, 1891. Beginning dose, .0005; maximum dose, .0007; total, .099 gramme; twenty-eight injections.

Effects.—No general, but frequently local, reactions, increased cough and expectoration, distinct changes in the character of the latter to a gelatinous appearance.

Result.—Examination April 20, 1891.

Lungs.—Much better percussion-note, especially in left lower, but also in both upper lobes, cavity on right side much smaller, not demonstrable posterior, not a vestige of any râles, gurgles, or crepitation anywhere. Shrinking of both apices, a gradual improvement in character of respiration, entirely vesicular in left lower, faintly so in upper lobes.

Microscopical.—No elastic tissue, tubercle bacilli, Gaffky's scale, 1.

General.—Appetite very good, sleeps all night, cough greatly diminished, expectoration very slight, and mucous, much stronger, anæmia improved. Temperature 99° to 100°, pulse 90, respiration 21; vital capacity, 85 cubic inches; weight, 102 pounds; a gain of six pounds.

Patient's Statement.—"Very much better."

Classed as—Greatly improved.

Still under treatment.

CASE XVI.—Mr. W. A. C., aged 28; pulmonary tuberculosis. (Class A.)

No heredity; in good health until three months ago; weight, in health, 180 pounds.

Present Condition.—Lungs.—Infiltration right upper and apex left upper lobe, no breaking down, no râles, respiratory sounds in affected portions harsh broncho-vesicular, pleuritic creaking in both supraspinous fossæ.

Microscopical.—Sputum muco-purulent, no elastic tissue, tubercle bacilli, Gaffky's scale, 4.

General.—Appetite fair, sleep disturbed, cough moderate, expectoration eleven drachms. Temperature 99°, pulse 96, respiration 22; vital capacity, 170 cubic inches; weight, 135 pounds.

Treatment.—Koch's method from February 5 to April 18, 1891. Beginning dose, .0005; maximum dose, .04; in thirty-two injections. Total quantity of lymph used, .435 gramme.

Effects.—To .003 a short rise in temperature, frequently local reactions, with increased cough and expectoration, crepitation and increased percussion dulness.

Result.—Examination April 18, 1891.

Lungs.—Percussion dulness much diminished, respiratory sounds softer and smoother, distinctly vesicular, but subdued on right side.

Microscopical.—Last examination of sputum purely mucous, no bacilli, no more sputum available for examination.

General.—Appetite very good, sleeps all night, cough and expectoration absent; temperature, pulse, and respiration normal; vital capacity, 200 cubic inches; weight, 162 pounds; an increase of twenty-seven pounds.

Patient's Statement.—"He believes himself entirely well."

Classed as—Apparently recovered.

Still under treatment.

CASE XVII.—S. McC., age 52; pulmonary tuberculosis. (Class C.)

No hereditary predisposition. Duration of illness, seven years; weight, in health, 150 pounds.

Present Condition.—Examination February 7, 1891.

Lungs.—Percussion dulness both upper lobes, and left lower, bronchial respiration with fine râles right upper to third rib, cavernous respiration with râles posterior in infraspinous fossa, left side râles mask all respiratory sounds.

Microscopical.—Tubercle bacilli, Gaffky's scale, 2.

General.—Appetite good, sleep disturbed by severe cough, expectoration muco-purulent four ounces, general condition fair, short of breath. Temperature 99.5°, pulse 96, respiration 27; vital capacity, 125 cubic inches; weight, 143 pounds.

Treatment.—Koch's method from February 9 to April 19, 1891, twenty-nine injections. Beginning dose, .0005; maximum dose, .025; total quantity, .0995 gramme.

Effects.—No general, but frequently local, reactions, increase in cough and change in expectoration.

Result.—Examination April 18, 1891.

Lungs.—Percussion-note better and râles disappeared in right upper lobe, respiration more vesicular, cavernous respiration posterior absent. Left side râles diminished, broncho-vesicular respiration in upper, and harsh vesicular in lower, lobe.

Microscopical.—Tubercle bacilli, Gaffky's scale, 1.

General.—Appetite good, sleep better, cough less, except after lymph, expectoration diminished to one ounce, chiefly mucous, general condition and shortness of breath improved. Temperature and pulse normal, respiration 24; vital capacity, 140 cubic inches; weight, 145½ pounds; a gain of three and a half pounds.

Patient's Statement.—"Feels that he has improved."

Classed as—Improved.

CASE XVIII.—Mrs. J. S. C., aged 28; pulmonary and laryngeal tuberculosis. (Class C.)

No hereditary predisposition. Duration of illness, three years; weight, in health, 112 pounds.

Present Condition.—Examination February 9, 1891.

Lungs.—Excavation entire left upper and upper portion of left lower lobe, gurgling in cavities, râles throughout left lung, no respiratory sounds in base. Right upper lobe, cavity anteriorly below clavicle with gurgling, also posterior gurgling over middle of scapular region, râles mask every respiratory sound; right lower lobe good.

Larynx.—Swelling and infiltration of arytenoid cartilages and posterior commissure.

Microscopical.—Elastic tissue, tubercle bacilli, Gaffky's scale, 9.

General.—Appetite poor, sleep restless, cough incessant, expectoration four ounces. Temperature 102°, pulse 125, respiration 30 to 38; vital capacity, 65 cubic inches; weight, 96 pounds; very weak and anæmic.

Treatment.—First ten days by diet and rest, with improvement in general condition. Koch's method from February 21 to April 18. Beginning dose, .0005; maximum dose, .004; twenty-four injections; quantity of lymph used, .058 gramme.

Effects.—No subjective disturbance of any kind, local reaction in larynx, not observable in lung on account of the numerous râles and gurgles, in beginning expectoration and cough frequently increased after injections.

Result.—Examination April 12, 1891.

No moist sounds anywhere, cavities dry and shrinking, percussion-note much better, right apex puerile respiration, anterior cavity cannot be demonstrated, posterior a slight blowing sound is combined with vesicular quality of respiration.

Larynx.—Swelling diminished and infiltration reduced.

Microscopical.—Tubercle bacilli, Gaffky's scale, 2.

General.—Appetite very good, sleeps all night, cough greatly reduced, expectoration two to three drachms, chiefly mucous. Temperature 98° to 99½°, pulse 84 to 96, respiration 24; vital capacity, 85 cubic inches; weight, 108½ pounds, a gain of twelve and a half pounds; much stronger, and anæmia subsided.

Patient's Statement.—"Feels very much better."

Classed as—Greatly improved.

Still under treatment.

CASE XIX.—B. J., age 29; pulmonary tuberculosis. (Class C.)

Hereditary predisposition. Duration of illness, four years; weight, in health, 118 pounds.

Present Condition.—Lungs.—Excavation right upper lobe with râles, bronchial respiration, flat note entire right upper and middle lobes, left side front infiltration of apex with crepitation, posterior bronchial interrupted respiration to middle of scapula, few râles, puerile respiration in lower lobe anterior and posterior.

Microscopical.—Tubercle bacilli, Gaffky's scale, 4.

General.—Appetite indifferent, sleep good, cough moderate, expectoration two ounces. Temperature 101°, pulse 100, respiration 29; vital capacity, 130 cubic inches; weight, 109½ pounds.

Treatment.—Koch's method from February 28 to

April 18, 1891. Beginning dose, .0005; maximum dose, .00275; total quantity, .027 gramme; twenty-one injections.

Effects.—Slight general reaction to .001, frequently local reactions, with increased cough and expectoration, local soreness; lost one pound, with general reaction.

Result.—Examination April 18, 1891.

Lungs.—Percussion-note better on both sides, cavity dry, no râles anywhere.

General.—Appetite fair, sleep good, cough moderate, now usually dry, expectoration very little, mucous. Temperature 99°, pulse 80, respiration 20; vital capacity, 150 cubic inches; weight, 109½ pounds.

Microscopical.—Tubercle bacilli, Gaffky's scale, 4.

Patient's Statement.—"Not short of breath as before treatment, feels decidedly improved."

Classed as—Improved.

Still under treatment.

CASE XX.—E. S., age 32; pulmonary tuberculosis. (Class B.)

Hereditary predisposition. Duration of illness, two years; weight, in health, 149 pounds.

Present Condition.—Examination February 22, 1891.

Lungs.—Infiltration both upper and right middle lobe, fine râles thoroughout, especially left anterior.

Microscopical.—Tubercle bacilli, Gaffky's scale, 4.

General.—Appetite good, sleep good, cough little, expectoration one ounce, muco-purulent. Temperature 99.5°, pulse 86 to 96, respiration 22; vital capacity, 150 cubic inches; weight, 132 pounds.

Treatment.—Koch's method, in New York, twenty-one injections from .001 to 0.085; total, .636 gramme.

Effects.—In New York frequent general reactions, here general reactions avoided, frequently local reactions.

Result.—Examination April 1, 1891. In New York, diminution of râles stated to have taken place.

Lungs.—Râles absent, respiration more distinctly vesicular, shrinking of apices.

Microscopical.—Bacilli diminished, last examination Gaffky's scale, 0.

General.—Appetite good, sleep good, cough only once or twice in twenty-four hours, expectoration occasionally of a little mucus. Temperature normal, pulse 84, respiration 20; vital capacity, 168 cubic inches; weight, 136 pounds.

Patient's Statement.—Feels well, and thinks he has received much benefit.

Classed as—Greatly improved.

CASE XXI.—Mr. C. W. P., age 36; pulmonary tuberculosis. (Class C.)

Hereditary predisposition. Duration of illness, six years. Came to Asheville for climatic benefit five years ago; slow course; weight in health, 130 pounds.

Present Condition.—Examination February 28, 1891.

Lungs.—Excavation both upper lobes, right cavity dry, râles mask respiratory sound of entire right lung and in left coarse, and medium size râles are present to level of nipple anteriorly, and posteriorly to lower angle of scapula, balance of left lower lobe good, the same note of examinations was made in September and again in December, 1890.

Microscopical.—Tubercle bacilli, Gaffky's scale, 10, no elastic tissue.

General.—Appetite fair, sleep restless, cough frequent, expectoration nineteen drachms. Temperature 99.5°, pulse 112, respiration 27; vital capacity, 100 cubic inches; weight, 110 pounds.

Treatment.—Had been refused for Koch's method in December, but owing to the fact that no unfavorable symptoms have thus far followed its use in my experience a trial is consented to. Koch's method from February 28 to March 28, 1891. Beginning dose, .0005; maximum dose, .0025; total quantity, .014 gramme; eleven injections.

Effects.—No general symptoms except sleepiness, following six or seven hours after injections, first increased cough and expectoration, later decrease, swelling and soreness of axillary glands on both sides.

Result.—Examination March 30, 1891.

Lungs.—All râles absent on both sides, note on March 18 showed them already greatly diminished, percussion-note somewhat clearer, respiratory sounds are also improved where a comparison is possible.

Microscopical.—Bacilli, Gaffky's scale, 2, sputum since last week almost entirely mucous.

General.—Appetite much improved, sleeps very well, cough diminished, expectoration five drachms. Temperature normal, pulse 96°, respiration 24; vital capacity, 105 cubic inches; weight, 111 pounds.

Patient's Statement.—Knows he has been very much benefited, and wants to continue the treatment.

Classed as—Improved.

The patient has been under the same climatic conditions before, and no change was made except the changing of abode from his own comfortable home to this institution.

CASE XXII.—Thomas P. R., age 18; pulmonary tuberculosis. (Class B.)

Hereditary predisposition. Duration of illness, one year; weight, in health, 115.

Present Condition.—Examination February 11, 1891.

Lungs.—Infiltration of both upper lobes, small cavity, right upper lobe below clavicle, few râles left upper, harsh inspiration and crepitation in right middle lobe.

Microscopical.—Tubercle bacilli, Gaffky's scale, 4, well defined.

General.—Appetite fair, sleep good, cough little, expectoration one ounce. Temperature 100°, pulse 100, respiration 20; vital capacity, 165 cubic inches; weight, 115 pounds.

Treatment.—Koch's method from March 9 to April 20, fourteen injections. Beginning dose, .0005; maximum dose, .0025; total quantity, .023 gramme.

Effects.—One moderate general reaction with loss in flesh of two pounds, loss of appetite and general malaise for two days, subsequently only local reactions.

Result.—Examination April 20, 1891.

Lungs.—No material change, except that percussion-note in left upper lobe is slightly clearer, and crepitation in right middle lobe is only noticeable upon coughing.

Microscopical.—Bacilli, Gaffky's scale, 1, well defined.

General.—Appetite a little better, sleep good, cough absent, expectoration only on occasional days, scarcely enough for microscopical examination. Temperature normal, pulse 84, respiration 20; vital capacity, 182 cubic inches; weight, 115 pounds; has regained the two pounds lost during the reaction.

Patient's Statement.—"Feels better."

Classed as—Improved.

Still under treatment.

CASE XXIII.—A. A., age 30; pulmonary tuberculosis. (Class B.)

No hereditary predisposition; disease has lasted two years; weight, in health, 160 pounds.

Present Condition.—Examination February 28 and March 10, 1891.

Lungs.—Infiltration of both upper lobes and left lower lobe, there also pleuritic thickening, and medium-sized catarrhal râles, harsh inspiration, and pleuritic creaking in right infraspinous fossa.

Microscopical.—Tubercle bacilli, Gaffky's scale, 2.

General.—Appetite good, sleep good, cough moderate, expectoration slight, strength good, but short of breath. Temperature 99°, pulse 84, respiration 20; vital capacity, 200 cubic inches; weight, 151½ pounds.

Treatment.—Koch's method from March 11 to April 20, 1891. Beginning dose, .0005; maximum dose, .005; total quantity, .045 gramme; eighteen injections.

Effects.—Local reactions frequent, no general reaction.

Result.—Examination April 20, 1891.

Lungs.—Percussion-note clearer, especially on right side, respiration vesicular, but less distinct than in lower lobe, left upper also better quality and less harsh vesicular respiration, lower lobe râles all gone, indeterminate character of respiration there.

Microscopical.—Tubercle bacilli for last two examinations absent, sputum present only on occasional days.

General.—Appetite and sleep good, cough absent, expectoration none, feels strong and well, is never short of breath now. Temperature, pulse, and respiration normal; vital capacity, 240 cubic inches; weight, 157 pounds; a gain of five and a half pounds.

Patient's Statement.—Thinks he has been greatly benefited.

Classed as—Apparently recovered.

Still under treatment.

CASE XXIV.—Mr. J. McC., age 41; pulmonary tuberculosis. (Class A.)

Hereditary predisposition. Beginning of disease, eight months ago; weight, in health, 133 pounds.

Present Condition.—Examination March 17, 1891.

Lungs.—Infiltration with bronchial respiration, and fine râles right upper lobe, and also of left apex, there inspiration harsh, interrupted and crepitation at end.

Microscopical.—Tubercle bacilli, Gaffky's scale, 2.

General.—Appetite fair, sleep fair, cough moderate, expectoration muco-purulent two ounces, general condition fair. Temperature 99°, pulse 100 to 110, respiration 22; vital capacity, 140 cubic inches; weight, 119 pounds.

Treatment.—Koch's method from March 17 to April 20, fifteen injections. Beginning dose, .0005; maximum dose, .0025; total quantity, .022 gramme.

Effects.—No general, but frequently local, reactions, increase and change in quantity and quality of expectoration.

Result.—Examination April 20, 1891.

Lungs.—Percussion note clearer, respiratory sounds more vesicular and smoother, no râles or crepitation anywhere.

Microscopical.—Occasionally one bacillus in a field, frequently none at all.

General.—Appetite very good, sleep good, feels stronger and better, appearance improved. Temperature, pulse, and respiration normal; cough very little, expectoration one-half ounce, almost entirely mucous; vital capacity, 150 cubic inches; weight, 124 pounds.

Patient's Statement.—Feels decidedly improved.

Classed as—Greatly improved.

Still under treatment.

CASE XXV.—Mr. E. S., age 20; pulmonary tuberculosis. (Class C.)

Hereditary predisposition. Duration of disease, seven months; weight, in health, 145 pounds; frequent hemorrhages.

Present Condition.—Examination on admission.

Lungs.—Excavation both upper lobes, râles throughout left lung, also right lung, except lower lobe, where respiratory sounds are of indeterminate character.

Examination on March 20, 1891, râles much diminished.

Larynx.—Catarrh.

Microscopical.—Thick greenish purulent sputum, elastic tissue, bacilli, Gaffky's scale, 4.

General.—Very weak, appetite poor, sleep restless, cough frequent, expectoration twenty-six drachms, anæmic. Temperature 101°, pulse 120, respiration 30; vital capacity, 80 cubic inches; weight, 130 pounds; night-sweats.

Koch's method. Two months in New York, amount and result of administration not known.

Treatment.—Climatic and dietetic for two months after admission, with general and local improvement. Koch's method from March 20 to April 20, nine injections. Beginning dose, .0005; maximum dose, .0015; total quantity, .009 gramme.

Effects.—General and local reactions said to have occurred in New York, only local reactions occurred here.

Result.—Examination April 20.

Lungs.—Cavernous respiration in right supraspinous fossa and left apex; absence of râles in entire right and upper lobe of left lung, cavities shrinking, dry crepitation over scapula, and fine râles left lung posterior.

Larynx.—Normal (received local treatment for catarrh).

Microscopical.—Sputum muco-purulent, no elastic tissue, bacilli, Gaffky's scale, 4.

General.—Appetite and sleep good, cough better, expectoration five drachms, night-sweats absent, anæmia and strength improved. Temperature normal, pulse 84°, respiration 20; vital capacity, 100 cubic inches; weight, 139½ pounds.

Patient's Statement.—"Very much improved."

Classed as—Improved.

Still under treatment.

EXPLOSION OF COMPRESSED CHLORATE OF POTASSIUM TABLETS.

In *La Pratique Médicale* for May 5, 1891, it is stated that a patient suffering from ulcerative stomatitis had prescribed for him some compressed tablets of potassium chlorate. One day as he sat down a detonation was heard, and before he could free himself from his clothes he was seriously burned over an extent of more than nine inches. The chlorate of potassium tablets which he had been carrying wrapped up in a piece of paper in his pocket, together with a penknife, had detonated under the influence of the shock and set his garments on fire.

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Leading Articles.

NATURE AND TREATMENT OF DIPHTHERIA.

III.

AT the meeting of the *Société de Médecine Pratique*, January 3, 1889, when the paper of Dubousquet was read, commending the method of cauterizations advocated by Gaucher, Guelpa (who made considerable stir in the Society discussions of diphtheria) demanded if the good results which had been claimed for this method might not have been due largely, if not altogether, *to the frequent irrigations*, which formed a part of the treatment. The majority present at this and subsequent meetings were understood to deprecate all use of strong caustics, as well as the forcible removal of the false membranes.

At another meeting, held April 4, and at a subsequent meeting of the Therapeutical Society, Guelpa read a long paper in answer to the question, "*Why, in the treatment of diphtheria, do the same medicaments give satisfactory results to some practitioners and negative results to others?*

He criticised the numerous remedies which have been advised in this disease. Some, as resorcin, have been extolled as almost a specific. This medicament, so successful in the hands of Callias, saving nearly all his patients, has not proved efficacious in the practice of Cadet de Gassicourt, who has used it in all degrees of saturation.

Phenic acid has been highly commended by excellent authorities, notably Kempster, Jacobi, Oertel, Billington, Smith, and Mackenzie, but others have not found its effects especially favorable. The same judgment may be passed upon caustic soda and glycerin, lime-water, lemon-juice, boric acid, tannin, iodoform, and even perchloride of iron.

While recognizing the fact that there is a difference in the malignancy of epidemics, and that remedies act differently at different periods of the same epidemic, the writer, nevertheless, felt compelled to conclude that the same medicament in the hands of certain practitioners had given favorable results, while it had failed completely with others. The cause, he believed, he had found. We quote his words:

"M. Callias, repeating the trials with resorcin made by Andeer, Leblond, and Joja, is careful to tell us that he mops out the throat every hour, night and day, with a five per cent. solution. To this he adds spraying the buccal and nasal cavities with a two per cent. solution every two or three hours, and fumigations, twice or three times a day, with resorcin in substance, sublimated by a moderate heat. . . . Note the fact that the throat is swabbed out *every hour night and day*. . . . With regard to phenic acid, M. Roulin tells us that he employs his carbolic irrigations every hour in the twenty-four, and claims extraordinary success. Kempster and Rothe paint the throat every hour with a strong carbolic mixture, and use every half hour a weaker preparation for a gargle. Giovanni Calligari applies every quarter of an hour to the diseased places a one per cent. carbolic solution. Jacobi sprays and irrigates very frequently with carbolic solutions. Oertel declares that phenic acid constitutes the best and surest means at our disposal for combating diphtheria. But this medicament should be employed with energy. The practitioner should spray every two hours, every hour, or oftener, according to the age of the patient, with a five per cent. solution. The atomizing tube should be made to enter the patient's mouth. All practitioners have obtained excellent results from this frequent use of the carbolic preparations. Oertel, in fifty-one cases, did not lose a patient.

"If we come to the employment of perchloride of iron in diphtheria, we have still less difficulty in establishing the fact that the disease is the more surely and rapidly overcome the more frequently and thoroughly the part which is the seat of the disease is medicated with the solution employed. Thus, we see the Aubruns, father and son, administer to their diphtheritic patients a spoonful of a four per cent. solution every five minutes during the day, and every quarter of an hour at night. Jacobi advises to give the solution of perchloride of iron every quarter of an hour, or every hour, according to the gravity of the disease. Colson, Clar, Noury also administer this medicament *about every half hour, day and night.*"

It will be seen from the above extract that, in the estimation of the writer, it is *the frequency and thoroughness* with which the applications are made that are the principal elements of success. Firmly believing in the local origin of diphtheria, and that if the seat of the disease can be kept antiseptically clean, the microbes will be impeded or thwarted in their development, blood-poisoning and further extension by contiguity of the disease will be prevented, he advocates irrigations *every hour* of the nasal cavities (in the event of nasal diphtheria existing) and of the throat with a five per cent. chloride of iron solution. For this purpose, a common hand rubber-ball syringe will answer the purpose; the capacity of the rubber ball should be about four ounces. The nozzle, which should be of hard rubber, is inserted successively into each nostril, and the solution injected with sufficient force to penetrate the pharynx. When the irrigation is to be made by mouth, the nozzle can be inserted behind the last molar tooth. Generally there is no great difficulty. The child is held in the lap of the nurse or medical attendant, with the head pressed against the chest of the latter; and the canula of the syringe is slipped in behind the last molar. Generally at this moment the mouth is opened wide in the struggle, and it is very easy to inject with full stream quite a quantity of the liquid. Part of the liquid is swallowed, but the most of it flows back. For the nasal douches a weaker solution is recommended (3 per 1000).

Guelpa regards these irrigations as of great use "in fortifying the surrounding mucous membrane and in washing away the septic products, whose absorption constitutes the true danger of the disease, and whose accumulation serves to irritate the contiguous mucosa and render it a fit soil for the development of the diphtheritic bacillus." As for parasiticides, there are probably at least a dozen agents, any one of which, if used with sufficient frequency, will almost equally well fulfil the leading indication; phenic acid and perchloride of iron are among the safest; resorcin demands further trials; corrosive sublimate (1 to 5000) would probably be the best, if the free use of this bactericide were not attended with some danger. The intent of the irrigations is not to clear the throat or other diseased surface of false membranes. The false membrane, says Guelpa, need give no trouble as long as it remains *within certain fixed limits.* The true end of treatment is to prevent the pseudo-membrane spreading over too large a surface. If the false membrane is not allowed to extend, if the subjacent tissues are not irritated by the treatment, the diphtheritic patches will become loosened, and fall off in the course of a week; if other patches form in their places, these are always more limited, are thinner, and sooner mature and fall off.

Cousot, of Brussels, in the *Journal de Médecine et de Chirurgie Pratique*, April, 1889, also insists that the treatment of diphtheria at its commencement should be chiefly local; that it should destroy the germs of diphtheria wherever they appear; should entirely prevent putrefaction, and, at a later stage, when systemic infection occurs, local remedies should still be vigorously applied, and additional measures employed to relieve the general symptoms. The medicine for local use, which Cousot believes best fulfils these indications, is a mixture of acacia, spirits of peppermint, and tannin, employed in the following formula:

Mucilage of acacia, 100 parts;
Tannin, 10 parts;
Spirits of peppermint, 2 to 20 parts.

The syringe is employed for its application, for this alone permits sufficient irrigation and impregnation of the inflamed surfaces. If the false membrane occupies the pharynx, tonsils, or nasal fossæ, whatever may be the degree of its development, it is necessary to inject the mucilage and tannin into the mouth and nares *every two hours.* Whatever may be the degree of decomposition of the diphtheritic patch, its putrid odor ceases on the first application, and it contracts and becomes detached. The efficacy of this method seems to be established by abundant statistics.*

* Cited from Sajous's "Annual."

Whatever may be said of the efficacy of irrigations, they are not always easily administered, and the pursuance of this treatment every hour or two day and night is certainly fatiguing to the patient, and must more or less interfere with sleep. To be sure, acous in advocating these injections, in a discording to the French authorities most zealease fraught with so much danger as diphtheria, that treatment which will save the most lives should be adopted, no matter how difficult of execution. The question, then, for solution is this, Is the method of frequent irrigation the best method of meeting the indication? Good authorities have claimed most excellent results from milder measures. Thus a child may be made to frequently swallow a solution of chloride of iron without great difficulty, and this would appear to accomplish the same end as the forcible injection of the same fluid. Sprays containing carbolic acid can be used alternately with the mixture, and port wine (which contains tannin and alcohol) can be administered freely in the interval. An occasional irrigation, or even mopping out the throat, may be practised, the swabbing being done with due gentleness, so as not to cause lesions or excoriations, to be new centres of infection.

These are the principles of treatment advocated by numerous American authorities, as J. Lewis Smith, Abram Jacobi, C. E. Billington. Smith and Billington make much account of the frequent administration of tincture of chloride of iron. The following is a favorite prescription of the latter:

℞ Tinct. ferri chloridi, ʒiss;
Glycerin,
Water, āā fʒi. M.
Sig.—A teaspoonful every hour.

Smith gives about the same quantity of iron hourly, combined with four grains of potassium chlorate; the vehicle is simple syrup. Both deprecate forcible removal of the pseudomembranes and all energetic topical applications by sponge or probing. Besides the hourly dose of chloride of iron, Billington gives every hour a teaspoonful of a mixture of lime-water and glycerin, in which a little chlorate of potassium is dissolved. Both make much account of spraying with the hand atomizer, and prescribe solutions of carbolic acid and lime-water for that purpose. A favorite combination of Billington's is the following:

℞ Acid. carbolic., mxv;
Aquæ calcis, fʒvi. M.
Sig.—To be applied to the throat very frequently in the form of spray.

In nasal diphtheria, the nares should be syringed out two or three times a day with salt and water, then with a mixture of salicylic acid, ten grains, with thirty of sulphate of sodium, to glycerin, half a fluidounce; and water, two fluidounces and a half. For this injection, a hard rubber ear-syringe may be employed.

In adult patients, with particularly unyielding diphtheritic patches, once or twice a day a mixture of tincture of chloride of iron, 2 parts; glycerin, 1 part, may be carefully applied to the surface of the membrane with the tip of a camel's-hair pencil. It seems, says Billington, to shrivel up the membrane and hasten its disintegration. But strong applications should never be "mopped" over the inflamed throat, and it is not thought safe, as a rule, ever to apply a brush to a child's throat.

In a fourth and final number other aspects of treatment will be taken up.

THE LIMITATIONS OF BACTERIOLOGICAL THERAPEUTICS.

IF during the first half of this century advance in medicine was mainly along the line of pathological anatomy and morbid processes, the present age is characterized by the predominant interest everywhere manifested in the causation of disease. We do not mean that progress has ceased in other directions, but that etiology has especially attracted the attention of investigators. It was time that etiology should come to the front, for without some definite knowledge of the essential factors of disease, therapeutics can never be anything but empirical.

The etiological acquisitions of the past thirty years have certainly been such that we may well congratulate ourselves on living during the latter half of the nineteenth century. We have had demonstrations of the almost inconceivable influence of microscopic living agents in all the phenomena of nature, and in the pathological states of men and animals. "Zymotic" diseases, once ascribed to chemical, are now ascribed to living ferments. The pathogenic bacteria of a few infectious diseases (not certainly more than eight or ten) have been isolated, cultivated, and their causal relationship to the disease

with which they are found associated established (as we believe) beyond a reasonable doubt. A deep and lasting debt of gratitude is due to those indefatigable investigators who, instigated by the desire to learn the secrets of nature and to become benefactors of their race, have formulated those principles by which prophylactic medicine has so wonderfully profited. The septic (surgical and puerperal) diseases have almost disappeared from our hospitals, and every day human lives are saved by operations which formerly were regarded as eminently dangerous, and this beneficent result is brought about by attention to the simplest details of asepsis and antisepsis. Prophylaxis based on bacteriology has been applied to diseases peculiarly medical, and thereby the spread of typhus and typhoid fever, diphtheria, cholera, scarlet fever, and like affections has been materially retarded; in fact, by rigid isolation and disinfection, it has been found possible to nip epidemics in the bud.

Many parasitic skin-diseases have been found to be amenable to treatment directed to the cause, and we are fairly justified in classing diphtheria among the diseases suitable for local parasiticide medication and often cured thereby.

But it is too true that infectious agents outside of the organism, or implanted on an accessible cutaneous or mucous surface are more easily combated than those same agents when they have taken possession of the organism; in fact, they may not be deleteriously influenced by any remedy when they have invaded the blood and tissues. It is fondly to be hoped that safe "specifics" will yet be found with which to oppose every malignant microbe, but it must be remembered that we have not obtained any such happy results with more than possibly one or two internal diseases. It may be conceded that quinine cures malaria by destroying the micro-organism that causes the disease; if syphilis be a microbic disease, it may be presumed that it is by an antiparasitic action that mercury checks the ravages of syphilis. It is quite possible that in the future we may be able to combat other internal diseases with equal directness (the microbe of pneumonia, of typhoid fever, of tuberculosis, for instance), but it is nonsense for any one to assert that we have any such therapeutic weapons now at our command.

In fact, a consideration of the limitations of our knowledge will not fail to impress us with a sense of the limitation of therapeutics.

Doubtless bacteriology has shed important light on morbid processes generally, on inflammation, suppuration, gangrene, etc., enabling us, by excluding septic agents, practically to exclude inflammation. But the pathogenic agents of most of the infectious diseases are still unknown, and of the few whose miorobes have been identified and studied, how little do we know of the conditions, life history, transmutations, etc., of these microbes and of the ptomaïnes which they excrete?

Even in the case of those diseases with whose causal agents we are the best acquainted, it is very questionable whether the etiological knowledge we have obtained has as yet qualified us the better to treat them. If the lanceolate streptococcus of Pasteur, Fränkel, and Talamon may be regarded as the cause of pneumonia, certainly this knowledge has not helped us any the better to combat this microbe, and physicians are still far from agreed as to the best principles of treatment, some advocating veratrum and a return to antiphlogistics, others a stimulant and supporting treatment from the first.

So with regard to tuberculosis. It can hardly be affirmed that the knowledge gained eight years ago of the bacillary origin of tuberculosis, and since then confirmed in so many quarters, has much aided us therapeutically, and all systems of treatment based on antagonizing and destroying the bacillus in the lungs have been failures, unless, indeed, we except the new method of Koch, which is still under trial. We believe that the same may be said of cholera, typhoid fever, and erysipelas.

A NEW ANTIPYRETIC AND ANTIRHEUMATIC.

UNDER the name of hydrochlorate of phenocoll, Dr. Hertel, in the *Deutsche Medicinische Wochenschrift*, April 9, 1891, describes a substance for which great claims are advanced as to its antipyretic properties and its specific action in articular rheumatism.

The substance occurs in the form of a white, crystalline powder, and is a hydrochloric acid salt of amido-acet-para-phenetidin with the composition

$$C_6H_4{<}^{OC_2H_5}_{NH-OC.CH_2-NH_2},$$

a base which occurs through dehydration of glycocoll. The new compound is, therefore,

a phenacetin. The hydrochlorate of phenocoll is soluble in about 16 parts of lukewarm water. The base, while readily soluble in hot water, is almost insoluble in cold water; it is also readily soluble in alcohol, while it is only slightly soluble in ether, benzol, and chloroform. The base is only with difficulty acted on by weak alkalies and acids; concentrated acids or alkalies split the base up into phenetidin and glycocoll.

On the authority of Professor Kobert, this substance is stated to be practically non-toxic to animals, and exercises no hurtful influence on the blood, a point of marked contrast to most of the antipyretics.

Professor von Mering has also found that 28 grains given to a rabbit produce no toxic symptoms, while doses of 15 grains in cases of pneumonia and typhoid fever were able to reduce the temperature two degrees without collapse or cyanosis. 15 grains of phenocoll, as far as the action on the temperature is concerned, are stated to be about equal to 30 grains of antipyrin and about 12 or 15 grains of phenacetin.

Dr. Hertel publishes notes of several cases in the clinic of Professor Gerhardt, in which phenocoll was administered in watery solution, in doses of from 7½ to 15 grains, as an antipyretic and antirheumatic, the results seeming to show that single doses of 7½ grains reduce the temperature within about an hour on an average of about ½°, while a dose of 7½ grains, given for three successive hours, usually reduces the temperature about 1°, the reduction in temperature only, however, being of short duration. Single doses of 15 grains produced a fall of temperature of 1° to 1½° C. in one or two hours. With seventy-five grains given in divided doses in twenty-four hours in the majority of cases the highest febrile temperatures may be reduced to normal. No chills, sweating, or collapse were noted. In three or four cases of acute articular rheumatism, even after antipyrin, salicylate of sodium, and phenacetin had failed to produce relief, seventy-five grains of phenocoll, in divided doses, given in twenty-four hours, are said to have relieved the pain in the affected joints, but without influence on the temperature. The remedy is said to have no hurtful action on the kidneys, although, after seventy-five grains have been administered, the urine becomes dark-brown. No statement is made as to whether this substance is a proprietary remedy or not; but, considering its source, it is pretty safe to assume that it is either patented or trade-marked.

Reports on Therapeutic Progress.

SOME NEW USES OF SALINE PREPARATIONS.

In the *Provincial Medical Journal*, vol. cx., 1891, Dr. John Strahan, under the above title, records some uses of the salines in various diseases, many of which would not suggest themselves to most practitioners. Thus, in pleurisy, Vulpian and Lauder Brunton have established the fact that salines produce an outpouring of fluid from vessels in the intestinal canal, as well as a greatly-increased secretion from all the glands of the mucous membrane. Nothing better reduces abnormally high arterial tension, because, if the abdominal vessels are much emptied, pressure must fall generally, as Lauder Brunton has shown. Thus, a saline purge will often relieve renal congestion, and thus act as the best diuretic. Even in the healthy a saline purge will often greatly increase the quantity of urine, although a great quantity of fluid had been discharged by the bowels. For such purposes salines should be given in only as much fluid as will dissolve them. Their affinity for water must then be met by exosmosis through the intestinal capillaries. In some cases of general anasarca—whether cardiac, renal, or merely anæmic—the effects of a few ½-ounce doses of sulphate of magnesium is very striking, and can only be approached by puncture of the swollen leg. Such treatment is often of the greatest value in acute, subacute, and even chronic pleurisy, as originally remarked by Sir William Gull. He recommended sulphate of sodium, ½ ounce, three times daily. This plan exceeds in advantage the use of subcutaneous doses of pilocarpine.

Another point is, that salines will act just as freely and as promptly in the case of a patient under the influence of morphine or opium as if such drugs were not present, which is often of the greatest advantage, and which can hardly be said of any other purgative. 1 ounce of sulphate of magnesium will produce a full watery movement in two or three hours, and without the slightest griping or pain, in a man who is narcotized by opium, etc.

Numerous cases have been reported by various authorities, in which the most satisfactory results followed the administration of from 2 to 4 drachms of sulphate of magnesium twice daily, the pain, if necessary, being

controlled by opium. Milk diet is a valuable accessory to this method of treatment; so also in general renal and cardiac dropsy and anasarca the salines act as efficient diuretics by removing stasis of the renal veins, and in ascites from portal obstruction salines are still more useful, as they act directly on the organ concerned. The œdema of the lungs and œdema of the brain, which so often imperil life in Bright's disease, are usually more quickly and decidedly benefited than any other plan of treatment, while it is known that free purging in cases of dropsy or anasarca is not followed by weakness and exhaustion, as it would be in other cases, or even in health. As a rule, it is best to simply prescribe the sulphate of magnesium in mixture with dilute sulphuric acid and extract of licorice, which quite disguises the taste. If the sulphate is ordered in 4- or even 2-drachm doses every four hours, a profuse but painless diarrhœa will be established, which is perfectly within the control of the medical attendant. Again, in uræmic cases, and irritable and inflamed states of the stomach and intestines, salines may be freely and painlessly employed when no other purgative would be dreamed of, except perhaps calomel. The circumstances which exclude salines with all other purgatives are inflammation and probable perforation of the vermiform appendix, perityphlitis and peritonitis from perforation. Fæcal impaction and simple typhlitis are, on the other hand, strikingly remedied by salines, when other purgatives may cause enteritis or peritonitis, while croton oil, jalap, senna, etc., cause violent excitation of the muscular coat of the bowels, and thus often intense pain in the bowels in the healthy. Another fact well worthy of attention is that the salines will wash out the bowels of a deeply-narcotized patient just as quickly as of a non-narcotized patient; the dose, though, requires to be fuller. But by giving the saline in ½- or ¼-ounce doses, every two or three hours, any danger of too great a dose is removed. So that, where there is a violent pain which calls for alleviation, opium may be given, and then by giving a saline every two or three hours, the irritant is removed. If the irritability of the stomach should be so great, as through constant vomiting, to prevent the administration of salines through the mouth, they may then be given by enema, and any one who gives 2 ounces of sulphate of magnesium as a purgative enema will be thoroughly satisfied with its quickness, thoroughness, and its perfect painlessness. An admirable formula is sulphate of magnesium, two ounces; glycerin, one ounce; water, enough to make four ounces; which is perfectly unirritating and absolutely reliable. Glycerin in this formula is undoubtedly a useful adjuvant; but while glycerin produces solid stools, the salines in the formula lead to the excretion of large amounts of liquid, and consequently a fluid passage. In stricture of the intestine, as in cancer of the rectum, nothing can equal salines which cause fluid stools, generally always painless ones, for salines liquefy the fæces, so that they may pass through the narrow gut without pain or straining, thus avoiding danger of perforation or rupture. This also applies to all diseases of the rectum attended by difficult defecation, such as ulcers of the anus.

Finally, Dr. Strahan calls attention to the uses of salines for lead colic, in acute dysentery, and in rectal and pelvic hemorrhage, especially if the latter condition is due to constipation or to the presence of hemorrhoids, although in the latter state free purgation is always injurious. A useful combination consists in a saturated solution of sulphate of magnesium, seven ounces: dilute sulphuric acid, one ounce; with a little fluid extract of licorice, which entirely disguises the nauseous taste of the Epsom salt. Dr. Strahan, in conclusion, calls attention to the fact that the salines at present constitute the most successful treatment of peritonitis.

THE TREATMENT OF HÆMOPTYSIS.

In a paper published in the *Zeitschrift für Therapie* for April 1, 1891, PROFESSOR NOTHNAGEL calls attention to the fact that the most essential feature in the treatment of hemorrhage from the lungs is that the patient should be kept absolutely quiet, should not be allowed to speak, the room should be kept at a moderate temperature, and he should eat nothing warm, and his food should be of the most readily digestible character, cold milk being preferable to anything else; and, in fact, Professor Nothnagel advises that for two days the diet shall be confined solely to cold milk. It used to be taught that coughing was of assistance in removing the blood from the bronchi, but this is now recognized as being an extremely hurtful teaching, and the first attention should be directed towards suppressing coughing, and for this purpose morphine is the chief remedy. When the hemorrhage is only moderately severe, noth-

ing further need be given to the patient than morphine; but when, as occurs in many cases, the hemorrhage does not spontaneously cease, then other remedies have to be given.

At first Professor Nothnagel calls attention to the remedies which ought not to be given, remedies which have been frequently recommended, and which yet may produce most disastrous effects. First of all in this connection he calls attention to the sesquichloride of iron. This, as is readily comprehensible, is only of use as a hæmostatic in external hemorrhages, and then likewise only when those hemorrhages come from capillary vessels. Even in the hemorrhage which may follow the extraction of a tooth, it must be used with the greatest care. As is well known, this remedy causes coagulation of the blood, and so leads to the formation of a thrombus, while its constricting action on the blood-vessels is so slight as not to be worth attention. When given internally, even if it is absorbed, which is extremely doubtful, it must form other combinations, and then will only produce the action of any other iron preparation which evidently would lead to an increase of the bleeding; and it is an old rule, but a good one, that individuals with a hemorrhagic tendency must be very cautious in the use of iron preparations. As a consequence, then, the internal use of the solution of sesquichloride of iron is neither theoretically nor practically of the slighest use. The same remarks apply to tannic acid and alum. These remedies only serve to constrict the blood-vessels when applied in dilute solutions. So also inhalations of all kinds should be strictly prohibited on account of the more vigorous respiration which this mode of treatment entails, and the consequent danger of increasing the hemorrhage instead of diminishing it. When, however, a violent hæmoptysis is to be treated, two substances are named, which may be of great service. The first of these is ergotin, which acts on the unstriped muscular fibre of the blood-vessels, and which may be given both internally and subcutaneously; the second remedy is the acetate of lead, which may be given in doses of from ½ to ¾ grain. There is still another remedy which might be employed with some prospect of success, although Nothnagel states that he has as yet had no experience with it, and that is *Hydrastis Canadensis*. Atropine also, in subcutaneous injections of $\frac{1}{64}$ grain, has likewise been claimed to do good. As to the use of common salt, given in teaspoonful doses, it is not clear as to whether the arrest of hemorrhages, so frequently reported to follow its employment, are coincidences or consequences of the treatment. At any rate, it can do no harm, and may do good, when nothing else is obtainable. As regards the application of cold externally, Nothnagel is very doubtful as to its value; for, in the first place, it is very uncertain as to whether the cold either directly or reflexly will succeed in producing vascular contraction at the affected part; and, in the second place, the application of cold to the surface of the thorax produces direct coughing, and coughing is certainly much more dangerous than the possible constricting value of a cold application.

Finally, Nothnagel alludes to the heroic measure of bleeding from a vein to arrest hemorrhage from the lungs, a proposition based upon the observation that a violent hemorrhage in leading to syncope often causes the arrest of bleeding. Of course such a procedure as bleeding for a hemorrhage from the lungs can be dismissed without discussion.

THE DETECTION OF THE BACILLUS OF TYPHOID FEVER IN DRINKING-WATER.

In determining the number of bacteria in waters by Koch's gelatin-plate process, the rapidity of growth of the colonies is largely dependent upon the temperature. Probably the best average temperature for the growth of bacteria in general is that of an ordinary room,—15° to 20° C.; and, as a rule, the common forms of bacteria found in unpolluted waters, grow best at this temperature, while higher temperatures check or retard their growth.

There is, however, another class of bacteria,—the parasitic germs,—which, normally habituated to the bodies of warm-blooded animals, grow best at blood-heat, although usually they do grow more or less at lower temperatures.

Bearing these facts in mind, we can readily understand what takes place in a gelatin-plate containing bacteria of both these classes, as, for example, a plate made from a sewage-polluted water containing typhoid fever germs, and which is cultivated at the ordinary temperature. Most of the common species are well suited to this temperature, and grow rapidly into large colonies, while the pathogenic germs are retarded in their growth, the temperature being nearly 20° below their normal. The chance of finding

these pathogenic germs is thus comparatively small, since the common germs, having the advantage over the former in more congenial temperature conditions, grow vigorously, and cover the plate, especially if they liquefy the gelatin, before the pathogenic germs have time to form colonies large enough to be recognized.

In the *Boston Medical and Surgical Journal* for April 23, 1891, MESSRS. ALLEN HAZEN and F. W. WHITE suggest that if the plates could be kept at blood-heat the above conditions would be reversed, the common germs retarded, and the pathogenic germ favored, so that the chance of finding the latter would be very greatly increased. As gelatin is, however, melted far below this temperature, they suggest the use of agar plate-cultures for this purpose.

Agar, when made up with bouillon, according to Koch's formula, in two per cent. solution, melts at about 90° C., and solidifies again at about 50° C., and can be kept indefinitely at blood-heat without softening. It is, of course, inadmissible to mix the water to be examined with melted agar at 90°, or even 50° C., because even this temperature might kill a portion of the bacteria, but if the agar is thoroughly melted in boiling water, and then suddenly plunged into water at 40° C., it can be cooled to this temperature without instantly solidifying. While the agar is in this condition fluid, and yet cool enough for safety, the water to be examined is quickly mixed with it, and the whole poured out upon a glass plate, when it almost instantly solidifies. There is ample time to perform this operation, but there must be no delay, for the agar will not long remain liquid. This method of making agar-plates is already well known.

Using Petri double dishes, instead of plain glass plates, moisture often rises from the agar, and, condensing upon the cooler cover, falls back on the agar, and softens it in places, so that the colonies extend unduly on the surface. The authors find that this can readily be prevented by turning the dishes upside-down. The plates are almost always sufficiently developed in twenty-four hours, and there is no liquefaction by the colonies.

The writers state that they have applied the method very successfully to the isolation of typhoid-fever germs from river water inoculated with a minute quantity of the bacilli, the agar-plate sometimes presenting, after only twelve hours' incubation in the thermostat, almost a pure culture of these germs. Using fæces from a typhoid patient, the typhoid germs were often detected when the gelatin-plates failed to show them, though in this case the plates also contain *bacillus coli commune* and others from the intestines. It is probably in this direction that the method has its greatest practical outlook,—namely, as an improved and rapid method for detecting pathogenic germs in drinking water, in fæces, etc.

Gelatin-plates, grown in the ordinary way, give approximately the total number of bacteria of all kinds present, making especially prominent, by rapid growth and large colonies, the common forms growing at low temperatures. Agar-plates, on the other hand, incubated in the thermostat, present a selected number,—namely, those which can live at blood-heat, including, we may believe, most of the parasitic and pathogenic germs, which, under the circumstances, are the ones of greatest interest; and eliminating those species which cannot grow at the temperature of the body, and are, therefore, in most cases, as such, presumably harmless.

SALICYL-SULPHONIC ACID—A NEW TEST FOR ALBUMEN.

Salicyl-sulphonic acid is a white crystalline substance readily soluble in water and alcohol. On slow evaporation it crystallizes in aqueous solutions in the form of long needles. It is formed by the action of sulphuric anhydride on salicylic acid, or by heating salicylic acid with concentrated sulphuric acid.

Salicyl-sulphonic acid is a remarkably powerful precipitant of proteid matter. It serves as an exceedingly delicate and precise test for the detection of proteids in solution. It acts upon all the classes of proteid bodies,—1, native albumens (egg albumen and serum albumen); 2, derived albumens (acid albumen and alkali albumen); 3, globulins (for example, serum globulin and myosin, also vegetable globulins); 4, fibrin (whether held in solution by dilute alkalies or by neutral salts; 5, proteoses (albumoses, etc.); 6, peptones.

In the case of all these substances salicyl-sulphonic acid at once forms a dense bulky white precipitate. When the proteid present is a native albumen, a derived albumen, a globulin, or fibrin, the precipitate is not redissolved on boiling; on the other hand, it becomes markedly flocculent. But when the proteid present in the solution tested with salicyl-sulphonic acid is an albumose or a

peptone, the precipitate redissolves on heating, to reappear on the cooling of the fluid. Hence it is easy by the application of heat to distinguish between a precipitate due to the presence of albumoses and peptones and one formed by the other proteids. The proteid thrown down by salicyl-sulphonic acid is not at the same time coagulated, as is the case with the precipitate caused by nitric acid, etc. This is shown by the fact that the precipitate is readily soluble in a dilute alkali, provided a sufficiency of the alkaline solution be added. Coagulated proteid is, as is well known, insoluble in such a solution. On the other hand, the precipitate formed by salicyl-sulphonic acid is not soluble in weak acids, nor, indeed, in strong acids, unless a large amount of the strong acid (such as nitric) is added.

When fluids containing proteids (for example, blood serum, solutions of egg albumen, solutions of albumoses and peptones) are freed from their proteid constituents by treatment with a large excess of absolute alcohol (after acidulation, when necessary) and filtration, they entirely fail to give the characteristic precipitate on the addition of salicyl-sulphonic acid. On the other hand, when the precipitate thrown down by the alcohol, after being well washed with alcohol, is redissolved in water and tested, it readily gives the usual proteid reaction with salicyl-sulphonic acid, a white precipitate being at once formed.

In the case of fluids containing proteids other than peptones (for example, blood serum) the proteid constituents can be completely removed by saturation with ammonium sulphate or sodio-magnesic sulphate, which precipitates the proteids. Here, again, the results are of the same character as those described above. The proteid-free filtrate gives no trace of the characteristic precipitate with salicyl-sulphonic acid. On the other hand, the proteid precipitate, when redissolved by the addition of water, gives a very evident and striking reaction on the addition of the reagent.

In the *British Medical Journal* for April 18, 1891, PROFESSOR A. MACWILLIAM publishes a number of experiments which he has made as to the value of this substance as a test for proteids. Professor MacWilliam finds that in the case of fluids containing minute amounts of proteid, the reaction which salicyl-sulphonic acid gives is an opalescence or cloudiness of the fluid, instead of the copious white precipitate obtained with such fluids as blood serum, etc.

When employed as a delicate reagent for the detection of traces of proteids, it is well to proceed as follows: Take a small quantity of the solution (for example, twenty to thirty minims), preferably in a very narrow test-tube, and add to it a drop or two of the saturated aqueous solution of salicyl-sulphonic acid; shake the tube so as to mix the reagent with the solution, and then hold it towards the light and look at it against a dark background. If necessary use two other tubes as control tubes, one containing some of the solution supposed to contain proteid, the other water and a drop or two of salicyl-sulphonic acid.

In the case of extremely weak solutions, where there is only a trace of proteid present, the opalescence resulting from the addition of the reagent may not be pronounced until a little time (one minute) has elapsed.

When opalescence is declared, the tube is then to be heated to the boiling-point, so as to demonstrate whether the opalescence clears up on heating or not.

In the case of very strongly alkaline solutions supposed to contain a trace of proteid, it may be necessary to add more of the reagent than usual, as some of it is used up in neutralizing the alkalinity of the fluid. And, in case of doubt, it is well to test the reaction of the fluid with litmus-paper after the salicyl-sulphonic acid has been added, in order to make sure that the alkalinity has been completely overcome and the fluid rendered strongly acid, which it ought to be for the proper action of the proteid test.

It is to be specially noted that the cloudiness or opalescence caused by salicyl-sulphonic acid on shaking it up with a weak proteid solution is uniformly diffused over the fluid; it is entirely distinct from such an appearance as that of a few scattered crystals floating here and there in the fluid and soon subsiding. (Such crystals may appear if the liquid under examination contains a considerable amount of certain salts; for example, ammonium sulphate, etc.).

In comparing the delicacy of this test with several others, Dr. MacWilliam found that this test served to determine the positive presence of white of egg when diluted twelve thousand five hundred times, while boiling after acidulation with acetic acid, xanthoproteic test, Heller's test, and the mercuropotassic iodide all failed to give a characteristic reaction when the white of egg was only diluted eight thousand times. As regards the applicability of this reagent as a test for albumen and other proteids in urine, Dr. Mac-

William states that urine containing albumen or other proteid gives a white precipitate with this acid, and in the case of the proteids ordinarily present in albuminous urine (albumen and globulin), the precipitate does not clear up on heating. On the other hand, it undergoes coagulation, becoming markedly flocculent with albumoses and peptones. The precipitates which these bodies give clear up on heating, to reappear when the fluid cools, hence the presence of albumoses or peptones in the urine, and so-called peptonuria may be readily detected by this reagent, and they may easily be distinguished from the forms of proteid ordinarily present in albuminuria. The fact that albuminous urine readily gives a marked precipitate with salicylic acid does not, of course, prove this reagent to be suitable as a test for the presence of albuminuria. Certain questions must first be considered, and these Dr. MacWilliam takes up in turn.

1. Is the precipitate really a proteid one, or is it due to some other substance present in albuminous urine?

2. If the precipitate is a proteid one, is it always obtained when proteid is present in the various abnormal conditions of urine which may have to be examined?

3. Is a similar precipitate given by any other possible non-proteid constituent of urine?

4. How does this test compare as regards delicacy and precision with those ordinarily employed?

He then deals briefly with these questions *seriatim:*

1. Is the precipitate really a proteid one, or is it due to some other substance present in albuminous urine?

The fact that salicyl-sulphonic acid gives no precipitate with normal urine tends to show that the ordinary constituents of urine are not the cause of precipitation in albuminous urine.

When albuminous urine is deprived of its proteid constituents,—for example, by saturation with ammonium sulphate and filtration,—the proteid-free filtrate gives no precipitate whatever when tested with salicyl-sulphonic acid (the filtrate may be freed from excess of ammonium sulphate by dialysis).

On the other hand, the proteid precipitate thrown down by ammonium sulphate, when washed with saturated solution of the salt, and redissolved in water, readily gives an abundant precipitate when tested with the acid in the usual way; and the presence of proteid is confirmed by other proteid reactions.

Again, the fact that the precipitate thrown down by salicyl-sulphonic acid in albuminous urine is of a proteid nature can be shown in this way: the reagent is added to some of the urine, with the result that a precipitate is at once formed. The urine is then filtered, and the precipitate, after being thoroughly washed with a dilute solution of the acid, is redissolved by the addition of a very dilute alkali (for example, .1 per cent. KHO solution). The solution so obtained—the redissolved precipitate—is then examined by various well-known proteid tests, and found to give characteristic results, demonstrating the presence of proteid.

Again, in the case of urine containing albumose, the precipitate caused by salicyl-sulphonic acid may be shown to be a proteid precipitate,—precipitated albumose. We can remove the albumose by saturating the urine with ammonium sulphate and then filtering off the precipitate. The filtrate is found to be proteid-free. On the other hand, the precipitate, when redissolved in water, is found to give marked general proteid reactions, and also those peculiar to albumoses. In all the cases that the writer has as yet examined, the precipitate in urine (with salicyl-sulphonic acid), which cleared up on heating, to reappear on cooling, proved to be due to the presence of albumose.

Further, in the case of urine containing albumose, if the precipitate caused by salicyl-sulphonic acid be filtered off and redissolved in a dilute alkali, it is found to give the reactions of albumose.

Similar results are obtained with normal urine to which albumose or peptone has been added, with the difference, of course, that the peptone is not removed by saturation with ammonium sulphate, but remains in the filtrate, while the albumose is separated by filtration.

It is clear, from these experiments, that, both in the case of urine containing the ordinary heat-coagulable proteids (albumen and globulin) and in the case of urine containing proteids that are not coagulable by heat (albumoses and peptones), the precipitate thrown down by salicyl-sulphonic acid is of a proteid nature,—it is a precipitate of the proteid present in the urine. The results obtained in albuminous urine are in complete agreement with those obtained with white of egg and blood serum. They make it plain that the proteid is what gives the precipitate, and that the ordinary constituents of urine are entirely unable to give such a result.

2. If the precipitate is a proteid one, is it always obtained when proteid is present in the various abnormal conditions of urine which may have to be examined?

Dr. MacWilliam writes that he has examined a large number of samples of urine containing albumen in different conditions,—for example, acid and alkaline urine, urine rich in phosphates (deposit), in urates (deposit), mucin (deposit), sugar, bile, etc. In every case he was able without difficulty to recognize the presence of albumen by means of salicyl-sulphonic acid.

The most noteworthy point was that when the urine is very strongly alkaline, as in the case of urine which has undergone an extensive alkaline fermentation, it is necessary to use much more of the reagent proportionately to the amount of the urine tested than in ordinary cases. This is because—as in the case of acidulation by other acids (for example, nitric)—it requires a larger amount to render the urine acid, a portion of the reagent being used up in combining with the alkali present. (This is accompanied by marked effervescence when the urine has undergone ammoniacal decomposition.) And until more acid has been added than is required to combine with the alkali, the albumen is not precipitated. Of course one can economize the reagent in this case by using a smaller amount of urine, so that the relative proportion of acid is greater than the usual. And one can easily make sure that a sufficiency of acid has been used by testing the reaction of the fluid, which now ought to be markedly acid.

It is only, however, when the alkalinity of the urine is very strong that any special precaution is necessary, as with slighter degrees of alkalinity precipitation of the albumen occurs readily on the addition of a drop or two of salicyl-sulphonic acid, as described when dealing with solutions of egg albumen.

3. Is a similar precipitate given by any other possible non-proteid constituent of urine?

The author has examined a large number of varieties of proteid-free urine, and has as yet failed to find any other constituent which gives the characteristic proteid reaction with salicyl-sulphonic acid. The following results may be stated:

Urine which is turbid from precipitation of phosphates clears up on the addition of this reagent, just as with nitric or acetic acids.

Urine containing excess of urates gives no precipitate with salicyl-sulphonic acid.

Proteid-free bilious urine gives no precipitate. Bilious urine, containing albumen as well, gives no precipitate when the albumen has been removed by means of alcohol, etc.

Ox bile was also examined with refrence to the possible influence of the reagent on bile salts, etc. The bile was treated with a large excess of absolute alcohol for a number of days, so as to precipitate the bile mucin, and then filtered. The filtrate was evaporated to dryness, and, after being washed with alcohol, the dry residue was redissolved in water. The solution so obtained was still of a bilious color; it contained bile salts, as shown by its powerful precipitant action on solutions of acid albumen, etc. With this solution, containing bile salts and pigment, salicyl-sulphonic acid gave no precipitate.

As regards the possible influence of the presence of a large amount of mucin in the urine, there is no reason to believe that such would prove a source of error when the test is performed, as described in the next section. Moreover, it is probably only in the case of alkaline urine, when there is at the same time a marked irritation of some part of the urinary passages, yielding a greatly increased mucous secretion, that the amount of mucin in the urine can be sufficient to come into question at all. But in such conditions of the urinary tract the detection of a trace of albumen is probably of no significance.

Dr. MacWilliam has examined solutions of mucin in lime-water (obtained from the vitreous humor, which is rich in mucin), and has seen very little change on strongly acidifying such a solution with salicyl-sulphonic acid,—certainly nothing like the marked effect of acetic acid. Proteid-free urines of persons taking various drugs have not given any precipitate with salicyl-sulphonic acid (the urine was in each case proved to be proteid-free by other tests, sometimes applied after the urine had been concentrated, in order to augment the delicacy of the reactions) after large doses of alcohol, sulphonal, strophanthus, iodide of potassium, morphine, quinine, croton-chloral, after chloroform anæsthesia, etc.

These results are in marked contrast with those obtained with such reagents as a solution of mercuro-potassic iodide (Tanret's reagent); the latter gives copious precipitates in many of those samples of urine.

Solutions of various alkaloids and other substances, many of which give precipitates with some of the known tests for albumen (for example, mercuro-potassic iodide), were examined, and gave no reaction with salicyl-

sulphonic acid,—solutions of aconitine, strophanthin, quinine, ergotin, caffeine, theine, antipyrin, digitalin, gallic acid, morphine, nicotine, chloral, atropine, strychnine. Balsam of copaiba rubbed up in dilute caustic potash solution becomes markedly turbid on the addition of nitric acid, but shows no change with salicyl-sulphonic acid.

With normal urine, concentrated by evaporation to one-half its original bulk, salicyl-sulphonic acid gave no precipitate or cloudiness. The cold nitric-acid test, on the other hand, showed a considerable amount of precipitation at the junction of the acid and the urine, stimulating the presence of albumen.

It need hardly be remarked that the question of the action of salicyl-sulphonic acid towards possible abnormal constituents, medicinal substances, etc., is one that can only be fully answered by extended observations.

4. How does this test compare as regards delicacy and precision with those ordinarily employed?

Probably the most common test for albumen in urine is the application of heat combined with acidulation. It is pretty generally recognized that the acidulation (when necessary) should be performed before, and not after, the heating; also that acidulation with acetic acid is greatly preferable to acidulation with nitric acid, since, in the latter case, there is a much greater chance of albumen present in the urine escaping detection by being converted into acid albumen, which is not coagulated by heat.

The difficulties connected with the test by acidulation with acetic acid followed by heat, putting aside the chance of a precipitate of mucin being caused by the acetic acid, are—1, that by inaccurate acidulation (insufficient or excessive) albumen may fail to be detected even when present in significant amount; 2, that in favorable circumstances (the most suitable degree of acidulation and rapid heating) this test may be extremely delicate,—excessively delicate, as many urge,—giving a reaction with a proportion of albumen which is clinically insignificant and apt to mislead. In the case of urine which already is somewhat acid in reaction and consequently requires only slight acidulation, there is no doubt that the careful addition of a suitable amount of acetic acid, followed by a rapid heating of the upper stratum of the fluid, is a test of a very great delicacy.

On the other hand, the cold nitric acid test (Heller's) has often been found to be defective in precision, allowing albumen, even when present in significant amount, to escape notice. It has been felt by many observers that it is desirable to possess a test intermediate in position between the defective delicacy of Heller's test on the one hand and the extreme delicacy (in favorable circumstances) of acetic acid and heat on the other. Such an intermediate test is afforded by salicyl-sulphonic acid when used in the following way: Add a drop or two of the acid to a small amount of urine (for example, twenty or thirty minims) in a small test-tube. Shake the tube quickly and examine immediately. The presence at once, or within a very few seconds, of a distinct cloudiness or opalescence in the fluid indicates the presence of an amount of proteid much smaller than is required to give a distinct reaction with Heller's test (allowing one minute for its development), but greater than is necessary to give a reaction by the acetic acid and heat method in favorable circumstances. This, then, is a test intermediate in delicacy between the cold nitric acid test on the one hand and the most favorable action of the acetic acid and heat test on the other. For example, a dilute sample of urine which gave a very slight film with cold nitric acid in course of a minute, gave an immediate opalescence on being shaken up with a drop of salicyl-sulphonic acid, even when diluted (with normal urine) two or two and a half times.

Again, it can be shown that when used in this way, the salicyl-sulphonic acid test is markedly less delicate than acetic acid and heat.

A sample of albuminous urine was diluted with normal urine:

1 part of albuminous urine in 200 parts: Acidulation with acetic acid and boiling = distinct opalescence of upper (boiled) stratum of fluid; salicyl-sulphonic acid = no visible change at once or for a number of seconds; in half a minute there is an evident opalescence, and in one minute it is more marked than with acetic acid and heat.

1 part albuminous urine in 400 parts: Acidulation with acetic acid and boiling = slight cloudiness; salicyl-sulphonic acid = no immediate effect nor for a number of seconds; in one minute an opalescence is present, more marked than with acetic acid and heat; this opalescence persists on boiling.

Hence it is evident that when *immediate* opalescence is made the test, salicyl-sulphonic acid is intermediate between the cold nitric acid and the acetic acid and heat-test. On

the other hand, when the presence of distinct opalescence after one minute or more is made the determining point, the salicyl-sulphonic acid test gives more delicate results than the heat-test (after acidulation when necessary) or any other tried,—picric acid, mercuro-potassic iodide, hydrochloric acid with saturated salt solution.

The main points to be noticed in regard to the salicyl-sulphonic acid test, as compared with the acetic-acid and heat-test, and the cold nitric-acid tests, are :

Its use as an agent of a delicacy intermediate between the other two tests ; or, if it should be wished, of greater delicacy than either. Its greater simplicity than the acetic-acid and heat-test ; for with the latter, in the case of urines of various grades of alkalinity, care has to be exercised so as to get a correct degree of acidity, in order to obtain certain results ; insufficient acidulation being attended with a danger of the albumen present not being coagulated on heating, and excessive acidulation leading to a similar fallacy by the formation of acid albumen, especially if accompanied by slow heating, which gives more time for the formation of this substance. With salicyl sulphonic acid there is no danger of adding excess, as, instead of a drop or two, very many drops may be added without harm. Indeed, the addition of an amount equal to the bulk of urine does not redissolve the precipitate formed. All that need be used, however, is an amount sufficient to render the fluid strongly acid,—usually a drop or two.

Further, salicyl-sulphonic acid enables one to recognize the presence of albumoses and peptones, which acidulation and heat or the nitric-acid test does not.

The drawbacks of the cold nitric-acid test, in addition to its insufficient delicacy, are pretty well known,—the possible precipitation of acid urates, resinous matters (copaiba, etc.), albumoses, etc. It is true that heat clears up such precipitates, but the application of heat—to the extent necessary to cause a precipitate of albumose to redissolve —is impracticable without involving a mixture of the strong nitric acid and the urine, and consequently a danger of albumen present being redissolved also.

In the case of mercuro-potassic iodide (a very delicate precipitant of albumen) there is the complication of its precipitating many alkaloids, bile-salts, urates in certain circumstances, etc., in addition to albumoses and peptones. And though subsequent heating may clear up the precipitate, it does not differentiate beween the various substances. And unless the proportion of the reagent present is a suitable one, the precipitate in some cases fails to clear up, and so simulates albumen. With picric acid, in addition to a much lower degree of delicacy, similar difficulties are present.

To conclude : The method of testing for proteids by salicyl-sulphonic acid may be briefly stated. Take a small amount of urine (for example, twenty minims). preferably in a very small test-tube, and add a drop or two of a *saturated* watery solution of the reagent. If the urine is strongly alkaline, an extra drop or two of the acid should be added, and, if no opalescence or precipitate occurs, it is well to test the reaction with litmus paper, and make sure that the urine has been rendered strongly acid. On adding the reagent, shake the tube quickly so as to mix its contents. Then examine at once. The occurrence of an opalescence or cloudiness *immediately or within a very few seconds*. (for example, two to three seconds) is a test for proteids intermediate in delicacy between the cold nitric-acid test on the one hand, and the acetic-acid and heat-test (in favorable circumstances) on the other. The development of an opalescence some time after (for example, one-half to two minutes) is a more delicate test than even acetic-acid and heat, and shows the presence of minute traces of proteid, which are probably insignificant from a clinical point of view, as a rule.

Next heat the tube to the boiling-point. If the precipitate or opalescence is caused by the ordinary "albumen" (albumen and globulin), commonly present in albuminous urine, it does not disappear on heating, but, on the other hand, becomes markedly flocculent. But if the precipitate or opalescence is due to the presence of albumoses or peptones, it clears up on heating (before the boiling-point is reached) and reappears when the tube cools.

ACTION OF OPIUM AND MORPHINE ON THE BOWEL.

SPITZER has published (*Virchow's Archiv*, cxxiii., Heft 3, 1891) an experimental investigation of the action of opium and morphine on the intestinal canal. His experiments were carried out on frogs, rabbits, and men ; his objects were to increase our very defective knowledge of the action of opium on the intestine, and to determine whether, as is generally assumed, opium is superior to morphine as an antidiarrhœic and anodyne in intestinal

affections. In frogs the bowel was exposed and kept moist with saline solution. Very small doses of watery extract of opium, given subcutaneously, sufficed to diminish the sensitiveness of the bowel to painful stimuli, while leaving intact the sensitiveness to stimuli which simply call forth peristalsis, the skin sensitiveness being also unaffected, and there being no general narcosis. In this condition the action of the opium may conceivably be exerted on the brain, or the spinal cord, or on nerve-centres in the wall of the bowel. The author concludes it cannot be on the brain, as the same result is obtained with decapitated frogs; he also thinks it cannot be on the cord, as its functions are otherwise left intact. The action must, therefore, be on the bowel locally, and this opinion is supported by the fact that even smaller doses, given *per os*, have an equal effect. That opium acts locally as an anodyne on the intestinal canal, apart from its general action, he further proves by giving a frog strychnine, and then tying the bowel midway between the stomach and anus. Stimulation applied to either half of the bowel equally called forth tetanic convulsions, but when a solution of opium was injected into the lower half, its sensibility was found to be greatly lessened in comparison with the upper half. Spitzer holds that the opium does not paralyze the ends of the sensory nerve in the bowel, but the sensory ganglia which, he assumes, lie in the course of the sensory nerves in the wall of the canal. These get an undue share of the opium as the alkaloids are excreted from the blood into the intestine, are absorbed into the blood again, and again excreted into the intestine, so that there is a constant circulation of them in the blood-vessels of the intestinal wall. The motor ganglia are also probably affected in the same way as the sensory, but either not so powerfully, or the action is not so readily demonstrable. Larger doses are required to diminish peristalsis than to diminish sensibility in the bowel. The diminution of peristalsis may be due to paralysis of motor ganglia in the bowel, or to a stimulation of the inhibitory centres in the cord from which the splanchnic nerves arise. Paralysis of the sensory nerve-terminations in the wall of the intestine does not occur, because after very large doses of morphine the peristaltic movements of the bowel become very marked, and experiments pointed to the conclusion that the diminution in peristalsis was very largely due to an action of the opium in paralyzing the motor ganglia in the walls of the intestinal canal. Large doses caused great increase of bowel peristalsis before general spinal tetanus was induced. The author thinks this is due to paralysis of the spinal cord, and consequent paralysis of the inhibitory action exerted by the splanchnic nerves. In this condition, however, the sensitiveness of the intestine to painful stimuli is much diminished. Morphine has the same action in every way, and quantitatively the activity of the opium is proportional to the amount of morphine it contains. The other alkaloids of opium have very little action on the bowel. On rabbits observations were made after exposing the bowel while the animal lay in a warm bath of saline solution. Spitzer confirms the well-known experiments of Nothnagel, in which he found that irritation of the bowel with sodium chloride is not nearly so effectul in increasing peristalsis after the administration of opium or morphine. If a portion of bowel be completely isolated and the same experiment repeated, then peristalsis is not interfered with; this result is regarded as proving that in this case the opium acts on the spinal cord, and diminishes the inhibitory action of the splanchnic nerves. Spitzer, however, points out that irritation of the bowel from without with sodium chloride scarcely corresponds to physiological peristalsis or increased peristalsis after purgatives or irritation from within of the mucous membrane, as the peristalsis takes place towards the pylorus, and is very inconstant in amount. He therefore irritated the bowel by injecting into it a fifteen per cent. salt solution, colored with indigo carmine. The rate at which this solution progressed down the intestine was observed in normal animals, and was found to be two or three times slower after opium or morphine, the peristalsis being also much more gentle and regular in the latter case. Even after complete isolation of a portion of the intestinal canal from its mesenteric nerves, opium greatly diminishes the peristalsis. Opium given subcutaneously acts exactly to the same extent, and no better, than morphine subcutaneously, its activity being proportional to the amount of morphine it contains. In healthy men opium by the mouth acts somewhat more powerfully on the bowel than when given subcutaneously. The reason, probably, is that the morphine is only slowly abstracted from the opium, and thus acts gently along the whole length of the bowel; it is not so quickly absorbed as pure morphine is, and in consequence does not produce so marked a general action. In diarrhœa, opium

per os is the most powerful,—more so than opium extract or morphine subcutaneously, or morphine by the mouth. In slight intestinal pain opium by the mouth is the best treatment, as we get the desired analgesia with small doses and without constitutional effect, the local action on the bowel being probably sufficient; in very severe pain hypodermic injection of morphine is most effectual. [The author does not discuss diminution of intestinal secretion as a factor in the astringent action of opium.]—*British Medical Journal*, April 25, 1891.

EFFECT OF QUININE ON THE HEALING OF WOUNDS.

DR. SOKOLOFF has published some interesting observations on the effect of quinine administered to a wounded animal on the granulation and cicatrization of the wound. The experiments were conducted on rabbits. The fur was shaved from a portion of the paw, and an incision made through the skin and into the muscular tissue, the external wound being then sewn up and the whole dressed antiseptically. Subsequently microscopical observations were made on sections including the wound. Twenty-four rabbits which were experimented on in this way were treated with hydrochlorate of quinine, half a grain of which was given per diem for each kilogramme of body-weight. A similar number of control rabbits were operated upon in precisely the same manner, but were not given quinine. Dr. Sokoloff gives a detailed description of the microscopical appearances observed each day for eight days in the two sets of cases. The effusion of blood was much the same in both, but there was a marked difference in the condition of the muscular tissue. In the control animals this lost its striped character, the portions in the immediate vicinity of the wound presenting the appearance of an amorphous homogeneous substance containing here and there a few muscular fibres or breaking up into separate pieces as in coagulation necrosis. Besides this, the muscular tissue gradually disappeared, leaving sheaths of sarcolemma either empty or filled with cells. In contrast to this state of things sections taken from the animals treated with quinine presented little or no sign of muscular degeneration, the fibres preserving their proper structure. With regard to the cellular elements in the control animals, two forms were found in the neighborhood of the wound,—a large number of multinuclear leucocytes, and a much smaller number of large round or oval cells with a single large nucleus. The mean diameters of these cells after three days were 19μ. and 16μ., after five days 17μ. and 13μ., and after eight days 18μ. and 15μ. During this period the nuclei presented various karyokinetic figures. In animals treated with quinine there were no multinuclear cells, all being oval, with a single nucleus, and smaller than the corresponding cells in the control animals, the mean diameters being after three days 13μ. and 10.5μ., after five days the same, and after eight days 14μ. and 11μ. The cells were, moreover, more numerous than in the control observations. In the quinine-treated animals the karyokinetic process commenced and finished earlier than in the others, the chromatin filaments being also less numerous but thicker. Altogether there was less inflammation with quinine than without; in short, without quinine there was Zenker's degeneration, with quinine none.—*Lancet*, May 9, 1891.

THE ACTION OF DRUGS ON THE VOMITING CENTRE.

C. T. THUMAS (*Virchow's Arch.*, Band 123, pp. 44, 69) has attempted to localize the position of the vomiting centre in dogs. The medulla oblongata and upper part of the spinal cord were divided transversely at various levels, and the position of the centre was defined by the application of a two per cent. solution of apomorphine to the medulla. It seems that pencilling the posterior angle of the fossa rhomboidalis with apomorphine causes violent and repeated vomiting. The section experiments showed that five millimetres in front of and behind the calamus scriptorius there is an area lying in the depth of the bulb, after division of which the subcutaneous injection of apomorphine no longer produces vomiting. Section of other parts of the medulla is followed by vomiting after the use of apomorphine. The direct application of emetin to the medulla oblongata also causes vomiting, but copper sulphate and zinc sulphate similarly applied have no effect.—*British Medical Journal*, May 9, 1891.

THE TREATMENT OF TYPHOID FEVER WITH COLD BATHS.

In our last issue we published a long communication by Dr. F. E. Hare, which seemed to show in the most conclusive manner a

marked reduction in the mortality of typhoid fever when systematically treated by the method of cold baths. The position so ably sustained by Dr. Hare is still further supported by a series of cases reported by Dr. BOUVERET in the *Lyon Médicale* for April 19 and 26, and May 3, 1891.

Dr. Bouveret's cases, which amount to only 100, gave him a mortality of but three per cent. Of the 97 cases cured, relapses occurred in 10, while 25 are stated to have been complicated with broncho-pneumonia, pulmonary hypostasis, pleurisy, erysipelas, phlebitis, etc. Of the 3 fatal cases, the first was only subjected to treatment on the tenth day of the disease, the second on the twenty-eighth day, and the third on the eleventh day; the latter dying thirty-six hours after his admission, death in this latter case being due to typical typhoid adynamia, and in the other two to severe and rapidly-progressing broncho-pneumonia. Of the 97 cases cured, 16 were light cases, 65 were moderate in intensity, and 16 are stated to have been very severe. The average duration of the fever was in the 97 cases thirty-six days. This, therefore, seems to show that the treatment with cold baths does not in the slightest degree shorten the febrile period. This statement, however, mainly applies to hospital practice, where the patients seldom come under observation until the disease has already made considerable progress. In private practice, where the fever may be readily recognized at the outset and at once subjected to treatment, perhaps systematic bathing might somewhat reduce the duration of the disease. Dr. Bouveret states that he has had several such cases under his care in which typical typhoid fever patients, systematically subjected from the very onset of the disease to bathing, showed absolute defervescence from the fifteenth to the twentieth day. The number of relapses, ten per cent., seems excessively high, and Dr. Bouveret acknowledges that he has himself noticed that relapses are more frequent in cases subjected to bathing than in cases treated by the expectant method, but that when such cases do occur only but few baths are required to again produce complete defervescence. So again of the complications, many of them are purely accidental. Such for example, as thyroiditis and alveolar abscess, and abscess in the axilla, erysipelas, and purulent otitis. Again he states that in no one of his cases was there intestinal hemorrhage, and he believes that this was largely due to the method of refrigeration. Dr. Bouveret scarcely admits any contraindication for the application of this method, and he states that among the patients who were satisfactorily treated by bathing are to be found a woman pregnant at three months, another with voluminous uterine fibromata and metrorrhagia, and six nursing women, and in no case did he suspend the bathing during the menstrual period. All of these cases of typhoid were bathed without any inconvenience. The author states that when cases came under his care for the first time, when already in an advanced state of the disease, he commenced first with baths at a temperature of 79° or 80° F. If baths at this temperature produced considerable reduction in the temperature they are continued, but if the reduction in the febrile temperature is slight, then the temperature of the baths is reduced gradually to 68° F. Dr. Bouveret attributes the fact that he has never in his experience had syncope or any other signs of heart-failure occur from the administration of baths to the fact that he never uses really cold baths in his severe cases unless they are absolutely indicated. Also he always causes each bath in the severe cases to be preceded by friction over the entire body, with the exception of the abdomen, a procedure which has seemed to him to greatly assist in restoring the circulation to its normal degree, while, besides the dilatation of the cutaneous capillaries so produced assists in the loss of heat during the bath. During the employment of this treatment attention should be directed especially to the renal secretion and to the progress of the fever. Dr. Bouveret states that in systematic bathing, in his practice, on the third or fourth day, or sometimes even sooner, the urine loses its febrile character and becomes very abundant, limpid, and colorless, and may even be freed from albumen if it had been previously present. In fact, the author states that if this modification in the renal secretion is late in appearing or is absent, it to his mind is convincing proof that either the baths have not been given with regularity, that they were too warm or too short in duration, that the quantity of liquid given to drink was insufficient, or that the local refrigeration of the abdomen, which he likewise prescribes, had either been neglected or had been imperfectly attended to. For the local abstraction of heat from the abdomen he uses large rubber bags filled with cracked ice or ice-water, or bladders filled with ice-water and then wrapped in wet cloths

Under this application it is stated that the digestive troubles, meteorism, and diarrhœa are readily relieved.

LEUCORRHŒA.

At the meeting of the Harveian Society, held March 5, 1891 (*British Medical Journal*, April 25, 1891), DR. W. S. A. GRIFFITH read a paper on this subject. Leucorrhœa occurred at all ages, and was usually a symptom rather than a disease, and was not necessarily the result of recognizable disease of the structure from which the discharge issued. It was commonly met with at any age, as a result of anæmia and debility, and was readily cured by attention to those conditions without local treatment. Leucorrhœa he defined as a discharge from the vulva of any abnormal fluid other than blood or urine,—namely, mucus, serum, or pus. He defined a vulvar discharge of mucus to be leucorrhœa when the quantity exceeded that which could be removed by the usual daily bath. Any discharge causing cutaneous irritation, or which was offensive though not excessive, was also leucorrhœa. Leucorrhœa might arise in three ways,—1, by the formation of an excessive quantity of an otherwise normal secretion; 2, by alteration in composition as well as in quantity of the ordinary secretions; 3, by the addition of some extraneous secretion. The normal secretions were almost entirely formed by the mucous membrane and glands of the uterus; the vagina had no glands, and, being lined with true skin, not mucous membrane, could have no proper secretion, though it was possible that even in health there might be some transudation of fluid from its vessels. Vaginal mucus was uterine mucus retained in the vagina, and its acidity was due to decomposition. The mucus found in the body of the uterus differed very slightly, if at all, from that found in the cervix; it was, perhaps, less viscid. At the vulva the mucus of Bartholin's glands was added; the other glands of the vulva were sebaceous. The conditions in which these parts gave rise to leucorrhœa were described, as well as inflammatory collections of fluid (pus or serum), which, opening into the genital tract, might give rise to leucorrhœa. In a large majority of cases leucorrhœa came from an intrauterine source. Such cases were divided into two classes,—1, those in which the mucous area of the uterus was enlarged, 2, those in which it was not enlarged. The second group was very common in girls and women of all ages. No examination was necessary in single women; the patient's appearance of ill health was sufficient for practical diagnosis. No local treatment was necessary; the patient would speedily get well under judicious general treatment. In the first group of cases attention should chiefly be directed to diminishing the size of the uterus, if practicable; vaginal irrigation, as a rule, only benefited by bringing away retained discharges, and, unless there was a vaginal cause, could produce little effect on the diseased part.

COMMON THYME IN WHOOPING-COUGH.

Common thyme, which was recommended in whooping-cough three or four years ago by Dr. S. B. Johnson, is regarded by DR. NEOVIUS, who writes a paper on the subject in a Finnish medical journal, as almost worthy the title of a specific. During an epidemic of whooping-cough he had ample opportunities of observing its effects, and he came to the conclusion that if it is given early and constantly it invariably cuts short the disease in a fortnight, the symptoms generally vanishing in two or three days. They are, he finds, liable to return if the thyme is not regularly taken for at least two weeks. Regarding the dose, he advises that a larger quantity than Dr. Johnson prescribed be taken. He gives from one ounce and a half to six ounces per diem, combined with a little marsh-mallow syrup. He never saw any undesirable effect produced, except slight diarrhœa. It is important that the drug should be used quite fresh.—*Lancet*, May 9, 1891.

THE VIRULENCE OF THE BACILLI OF TUBERCULOSIS WHEN MIXED WITH DUST.

In a recent thesis are found the results of a series of interesting experiments made by DR. FELTZ on the duration of the virulence of tubercular sputum when mixed with dust, and on the effect of different degrees of temperature on the bacilli in these conditions (*La Pratique Médicale*, May 13, 1891).

In his experiments Dr. Feltz examined the resistance of the tubercular bacilli when mixed with common road dust. Specimens of this mixture were exposed for three days to temperatures of 104° F., 120° F., 136° F., and 152° F. Five guinea-pigs were inoculated from month to month with each specimen.

The specimen exposed to 104°, when inoculated on the 28th of July, killed all the

guinea-pigs. When inoculated on the 29th of August, it only killed three guinea-pigs. Specimens kept until September 29, October 30, and November 14, and then inoculated, only killed each one guinea-pig. The mixture exposed to 150°, inoculated into eight guinea-pigs on July 28 and August 29, gave the same results as the preceding. Inoculated on the 29th of September, it rendered three guinea-pigs tubercular. Inoculated on the 30th of October and the 14th of November, it produced no effect whatever. The specimen exposed to more than 136° F., inoculated the 28th of July, killed three guinea-pigs. Inoculated on the 29th of August and 29th of September, it killed one guinea-pig only. Inoculated on the 30th of October and 14th of November, it did not produce any effect. The specimen exposed to more than 152° for three days did not give the malady to any guinea-pig. The same result was also obtained from the specimen which had been exposed for only two days to the same temperature.

In the two series of experiments on the 13th of September, 1887, common road dust was mixed with tubercular sputum, and this mixture was divided into three parts. The first was exposed simply to the sun, and on the 15th of September Dr. Feltz inoculated with this specimen one dozen guinea-pigs. All died tubercular. On the 2d of January, 1886, this specimen was likewise inoculated into twelve guinea-pigs, and of these it killed three by tuberculosis; on the 4th of April, 1888, eight guinea-pigs were inoculated, of which one only died of tuberculosis; while, finally, eight guinea-pigs inoculated on the 1st of July remained healthy. On the 15th of September the second portion, which had been exposed to a temperature of 104° for two days, was inoculated into twelve guinea-pigs. All died tubercular. Ten were inoculated on the 2d of January and two only of these became tubercular. Eight were inoculated on the 4th of April; two became tubercular. Those inoculated on the 1st of July remained healthy. The third portion, exposed simply to the variations of the atmosphere, was inoculated on December 3, 1887; of the eight guinea-pigs, four only died from tuberculosis. Ten guinea-pigs were inoculated on the 10th of February. All remained healthy, as was also the case with those which were inoculated on the 1st of July.

The results of these experiments show that the virulence of bacilli mixed with dust exposed to the variations in the atmosphere lasts a little more than two months, and this duration of virulence is extended to about six months when the dust is exposed to the sun. If the bacilli in the form of streptococcus do not kill the subjects within twenty-four hours, cure is frequent and relatively easily produced.

THE ACTION OF APOMORPHINE AND APOCODEINE.

In the *British Medical Journal* (February 28, 1891) Dr. William Murrell writes that three years ago he commenced to use hydrochlorate of apomorphine as an expectorant in bronchitis. At first he gave it in very small doses, for the majority of his patients were dispensary patients, whom he saw but once a week, and he was especially anxious to avoid anything like an overdose. He began by $\frac{1}{10}$ grain, given by the mouth, and worked his way up, drop by drop, until he found that the majority of his patients could take a grain of apomorphine three times a day without any difficulty. He also writes that some of his patients were able finally to take 1½ to 3 grains a day without any difficulty.

Dr. Murrell states that he has notes of forty patients, who were under his care during the present winter. With one or two exceptions they were all suffering with bronchial catarrh, with or without emphysema. During the course of these experiments, Dr. Murrell was able to show that a patient who was made violently sick, vomiting at intervals for four or five hours, with $\frac{1}{8}$ grain, given hypodermically, took $\frac{1}{8}$ grain by mouth three times a day, or 2$\frac{1}{8}$ grains daily, without the slightest inconvenience. In the majority of cases the apomorphine was given in the form of solution, but in one or two cases it was made into pills. Dr. Murrell's notes seem to show that apomorphine, when given in these large doses by the mouth, exercises a most powerful expectorant action. With the view of testing the question of the rapidity of absorption, Dr. Murrell administered what would be an emetic dose of apomorphine, if given hypodermically, in the form of an ointment. Three specimens were prepared,—one with lard, one with vaseline, and one with lanolin,—each containing one-tenth of a grain to the drachm. They were given to patients, with instructions that they should be rubbed into the chest before the fire at bedtime. They produced no emetic effect. The strength of the ointment was then increased to one-fifth of a grain, and the result was the same. Sub-

sequently an ointment containing a grain mixed with an ounce was employed, and while acting as an expectorant it induced no nausea. If this effect can be constantly obtained, it is evident that we have at our disposal a drug which, from the fact that it may be relied upon to induce an expectorant effect when used in the form of an ointment, in case of children suffering from bronchitis it will be simply invaluable. Dr. Murrell has also employed apomorphine as a spray on the lines of the old ipecacuanha wine treatment, using for its administration a bottle with a conical bottom, a silver tube reaching to the apex, so that the whole of the solution could be utilized.

Dr. Murrell began with 10 minims of a ten per cent. solution in a little water for each inhalation, but he now writes that he frequently gives as much as ½ drachm at a dose. The expectorant effect is very marked, especially with large doses. Here, again, a point of interest occurs in regard to the action of apomorphine, a dose which would act as an emetic, if administered hypodermically, can be used as an inhalation without producing this effect. In the majority of cases under Dr. Murrell's care the apomorphine was given in mixture flavored either with syrup of *prunus Virginiana*, syrup of tar, or syrup of lemons. Dr. Murrell also made a few observations with the hydrochlorate of apocodeine, which he found likewise acted as a powerful expectorant, being administered with perfect safety.

THE EXTRACTION OF BROKEN NEEDLES.

All who have had much to do with this minor operation know how frequently a satisfactory result fails to be obtained unless the indications for a safe operative procedure are strictly observed. It is most unpleasant, after cutting and probing with the finger and forceps, to be obliged to tell a patient who has endured some pain and much discomfort that further attempts are useless, and that the fragment is still there; and perhaps suggest as the best consolation that the needle has a more free opening by which to work its way out. Dr. Steele, in the *Lancet* for May 9, 1891, states that for many years past he has declined to cut, in an attempt for removal of a needle, unless he could make out the situation of a point, and that the other end had a firm bearing to rest upon; giving the assurance that patience and watching are the proper treatment for the time being.

Lately, he writes, he has adopted a very simple, painless, and reliable plan. The first case in which he employed it was in the case of a young woman who had broken a needle into her left heel, and for three weeks had gone about using her right foot naturally, but resting only on the toes of her left foot. The slightest touch gave her great pain. The point of entrance was visible in the middle line of the tuberosities of the os calcis; the end of the fragment could be recognized through the skin, but the slightest pressure made it recede. Dr. Steele declined to operate, but directed that two thick corn-plasters, one on the other, should be applied, with the puncture occupying the central hole, and that she should walk freely and bear well upon the heel. This she did with perfect ease, and after ten days the needle presented and was withdrawn. It was the eye-end, and almost an inch long.

Soon after this Dr. Steele writes that he saw a little girl, aged three years, who had also trodden upon a needle which broke and entered between the ends of the metatarsal and tarsal bones. A surgeon saw her promptly, cut down, and tried for some time to extract the fragment, but failed. She often felt no inconvenience, but at intervals limped suddenly and complained of pain. She was persuaded to wear a corn-plaster, and after three weeks the portion of needle, which had been in more than three months, after producing a little superficial irritation, showed itself, and her nurse drew it out. So, also, the wrist and ball of the thumb are not unfrequently punctured, and if the fragment enters obliquely, or lies close to arteries or nerves, and cannot be forced into prominence, attempts at extraction are, to say the least, undesirable; whereas by adopting this simple method, after the manner of removing a thorn with the pipe of a key, and producing pressure with an elastic wristlet or slight steel spring, like a small truss, the fragment will work out and not give pain from any knocks while under the skin. In that awkward position, the soft parts by the sides of the ligamentum patellæ, this plan may be used. It recommends itself to every one's common sense, and has the great advantage of not leaving a cicatrix.

ACTION OF ALOIN.

Professor Meyer has chemically and physiologically examined aloin obtained from Barbadoes, Curaçoa, and Natal aloes (*Archiv*

f. Exp. Path., xxviii., Heft. 3 and 4, 1891). Barbadoes and Curaçoa aloes yield an identical aloin, the former containing about ten per cent., the latter about sixteen per cent. It has the formula $C_{16}H_{16}O_7$, is in yellowish-white acicular crystals, soluble in hot water and alcohol, much less so in acetic ether, and only in traces in chloroform, ether, and benzol. Natal aloes yield about fourteen per cent. of a different aloin, having the formula $C_{24}H_{26}O_{10}$, scarcely soluble even in hot water, soluble in 70 parts of boiling alcohol, very soluble in caustic soda, from which it is precipitated unchanged by acids. In experiments on animals and man the aloin was given *per os* and subcutaneously. For subcutaneous administration a solution in formamide was used; water may also be used for Barbadoes aloin, but the solution is more liable to decompose; the solution has a neutral reaction, and after injection causes burning pain for a few minutes, but otherwise has no evil effects. The aloin can be detected in the fæces and urine by tests which are given at length and which are extremely delicate. The experiments showed that aloin from Barbadoes and Curaçoa aloes acted with certainty as a purgative, whether given by the mouth or subcutaneously. The dose in both cases is about the same, which is explained by the fact that aloin, when given hypodermically, is excreted from the blood chiefly into the bowel, only a mere trace or none being found in the urine. In man, dogs, and cats there is no albuminuria after subcutaneous injection, but in rabbits—in which animals aloes does not cause purgation—subcutaneous administration is always followed by inflammation of the kidneys, albuminuria, and death. Its purgative action is as slow when it is given hypodermically as it is *per os*. The resin left after extraction of the aloin from aloes is also purgative. Natal aloin was active in dogs and cats only after very large doses; but if an alkali were added to it—so as presumably to decompose it—its activity was greatly increased. By subcutaneous injection it was always active. In man on an ordinary mixed diet, given alone or with an alkali, it had very little purgative effect, but in man fed on an exclusively animal diet it was much more active. The reason probably is that in the latter case the putrefactive processes in the intestine are much more marked, and the aloin is decomposed into a more active substance. All the experiments seem to point to the conclusion that aloin itself is not an active purgative, but that it becomes gradually decomposed in the intestine into a more active body, and hence the slowness of its action.—*British Medical Journal*, April 25, 1891.

ACTION OF LEECH EXTRACT ON BLOOD.

The general properties of the extract of the anterior part of the medicinal leech which, as Haycraft showed (*Proc. Roy. Soc.*, xxxvi.), possesses a strong anti-clotting action on blood, according to MR. W. L. DICKINSON, are the following: It is neutral to litmus-paper; its specific gravity is (*Pharmaceutical Journal and Transactions*, May 2, 1891) not appreciably higher than that of the medium used for extraction. Boiling causes no precipitate and no loss of activity. Alkalies cause no precipitate. A trace of acetic acid causes cloudiness, readily soluble in excess. Strong acetic acid causes no precipitate in salt-free, but a copious cloud in salt-saturated extracts. Nitric acid in the cold causes a precipitate soluble on boiling, and reappearing on cooling. Saturation with ammonium sulphate causes a precipitate, after which no proteid remains in solution; saturation with magnesium sulphate or sodium chloride, on the other hand, causes no precipitate. If all salts are removed from the extract by dialysis, there is no precipitate produced and no loss of power. Copper sulphate, lead acetate, and mercury chloride give precipitates insoluble in excess of the reagents. Copper sulphate and potassium give a pink (biuret) reaction. Alcohol causes no loss of the activity of the extract.

The leech extract, therefore, contains a proteid having some features in common with Kühne's proto-, and others with deutero-albumose. The albumose precipitated by ammonium sulphate has all the anti-clotting power of the original extract; the extract minus the albumose has no such powers. Hence, probably, the albumose is itself the active principle.

Clotting in plasma obtained from blood prevented from coagulating by admixture with leech extract (either intravenously or after it is shed) cannot be induced by carbonic anhydride or by dilute acetic acid; it can, however, always be induced by a sufficient quantity of fibrin ferment. Such plasma gives no precipitate on cooling.

Fibrin soaked in leech extract fails to yield ferment when subsequently treated with eight per cent. sodium chloride solution. The extract, however, still contains cell globulin

Cell globulin prepared from lymphetic glands by Halliburton's method, retains all its properties, except its fibrinoplastic power, when treated with leech extract. This is regarded as an argument in favor of the non-identity of the cell-globulin and fibrin ferment.

SULPHATE OF COPPER IN OBSTETRICAL PRACTICE.

Dr. Tarnier, it is stated in the *Centralblatt für Gynäkologie*, for May 8, 1891, has for some time been using a five per cent. solution of sulphate of copper for washing out the uterus and vagina after delivery, and is very well satisfied with the results. From control experiments made with streptococci and staphylococci, and from his clinical experience, Dr. Tarnier believes that he has proved that in this substance we have a readily obtainable, cheap, very soluble, relatively non-toxic, and an unusually active disinfectant; although it is not entirely free from disadvantages among which we might mention its color. In cases where corrosive sublimate is contraindicated sulphate of copper should by all means, in the writer's opinion, have the preference over every other antiseptic. Only against vibrios did its solutions appear to be negative.

THE PHYSIOLOGY OF THE SMALL INTESTINE.

The foundations of our knowledge of the physiology of gastric digestion were undoubtedly laid by the careful study of the historic of gastric fistula by Dr. Beaumont,—the case of Alexis St. Martin. Animal experimentation and the test-tube reactions of the laboratory cannot be compared in accuracy to observations made directly upon the living human organism, when these rare opportunities arise which permit of such a study. Then, too, it may happen that a considerable rectification of current physiological doctrine has to be made, and the laboriously gathered results of many observers have to be replaced by those made upon a single case. Much depends, then, upon the skill and thoroughness with which the study of the processes in the human subject are undertaken. It must be admitted that these qualities are conspicuous in the recently-published records of a study of the chemical processes of the small intestine by Drs. MacFayden, Nencki, and Sieber (*Lancet*, May 2, 1891). The subject of their researches was a female patient under the care of Professor Kocher, in whom an intestinal fistula had resulted from excision of a portion of gangrenous intestine due to strangulated hernia. The false anus was situated in the ileum just above the ileo-cæcal valve, so that the materials escaping thereby were wholly composed of the chyme which had passed through the whole length of the small intestine. For a period of nearly six months the woman lived under these conditions, permitting of a long series of observations relative to the time and character of intestinal digestion under varying forms of diet, etc. At the end of that time Professor Kocher re-established the natural channel by means of an operation which proved perfectly successful. It may be remarked at once that during the whole period when there was practically no large intestine the patient gained in weight, and, as the urinary analysis showed, eliminated a fairly normal quantity of urea.

The procedure consisted in adapting a flexible tube to the fistulous outlet, so as to collect all the material that escaped, and to note its characters under varying circumstances. In consistency this "chyme"—if it may be so termed—was more fluid and diarrhœal when the diet was albuminous than when it was mainly of a vegetable nature. It was seen that the flow of chyme from the small into the large intestine is steadily continuous, being least marked during the night, owing to no food being then taken; and by some ingenious experiments (*e.g.*, the addition of hard beans to the food, or of salol, which allowed of the detection of salicylic acid in the matters escaping) it was shown that the passage of foods from mouth to cæcum occupies at the least two hours; but all traces of the substances introduced did not disappear for from nine to fourteen or even twenty-three hours. The rate of flow, of course, bears much relation to the consistency of the intestinal contents. As regards the nature and properties of the evacuated materials, it is noticeable that they were almost free from odor, containing hardly any products of albuminous disintegration, such as indol and sulphuretted hydrogen; they were slightly acid in reaction, tinged yellow by bilirubin, and, according to the predominance of flesh or starchy matter in the food, showed muscle fibre, albuminous granules, vegetable fibres, starch granules, etc., and invariably a large number of various forms of bacteria. The filtrate yielded albumen, mucin, peptone, dextrose, the two forms of

lactic acid, acetic acid, and the biliary acids and bilirubin. The authors enter very fully into the characters of the bacteria they find, many forms being special to the small intestines, others existing also in the mouth; but, passing over these, which would entail a full description to be intelligible, we may glance at the main results of their researches, which somewhat modify accepted physiological teachings. One point of interest is the fact that albumen is hardly, if at all, decomposed in the small intestine. Even the action of the trypsin of the pancreatic juice is small, for leucin and tyrosin were not to be found. Probably, in health, albuminous disintegration takes place chiefly in the large intestine, and it is only in disease that it occurs in the stomach or small intestine. Among the products of such decomposition are iodol, skatol, phenol, sulphuretted hydrogen, carbonic acid, methylmercaptan, etc., all of which may be regained from the large intestine. The bacteria of the small intestine are concerned in the disintegration of the carbohydrates into lactic, acetic, and succinic acids, and also into ethylic alcohol. The authors, in noting this last-named fact, cannot avoid a thrust at the total abstainers. It is generally believed that the chyme is rendered alkaline by the secretion of the small intestine, but they find that, owing probably to the reinforcement of gastric acidity by the organic acids resulting from sugar, the total quantity of acid is more than can be neutralized by the bile, pancreatic, and intestinal juices. If, however, the alkalinity of these fluids be diminished, the intestinal contents are hyperacid, and mucin is precipitated instead of being intermingled with the chyme. This explained the diarrhœal quality of the evacuations noted to be associated with a large amount of sugar and organic acids in the chyme. On the other hand, an excess of alkalinity favors putrefactive decomposition, the acids apparently holding in check the bacteria concerned in albuminous disintegration. A marked contrast in this respect was exhibited between the small and large intestine. Putrefactive bacteria could hardly be at all isolated from the former, while they abounded in the latter; but this is not owing to the influence of bile, which NENCKI showed to have no real antiseptic property. The part played by bacteria in intestinal digestion is limited probably to the fermentation of sugar and carbo-hydrates generally, the excess of acid resulting from this fermentation being neutralized by the alkaline intestinal juice. But, much as bacterial life abounds in the intestinal canals, varying according to the kind and quality of the ingesta, it does not appear that the processes initiated by these organisms are of such value or importance in nutrition as the chemical ferments. Certainly the patient who was the subject of these observations gained in flesh, although for six months she was deprived of all the bacterial processes that go on in the large intestine.

THE TREATMENT OF ACUTE ANGINA.

In the *Journal de Médecine* for April 10, 1891, DR. CAPART publishes the following methods of treatment which he employs in different forms of angina. In acute suppurative tonsillitis he causes the patient to suck small pieces of ice and orders 20 grains each of powdered salol and milk-sugar to be divided into six powders, three to be taken each day; or an equivalent amount of salol may be made into an emulsion with gum-arabic and given according to the same directions. In addition, he prescribes a gargle composed of 15 grains of salicylic acid, 7½ grains of acetate of sodium in 9 ounces of distilled water, flavored with a little syrup. As a prophylactic measure against the return of abscess in the tonsils, he advises the patients for at least a month to use a gargle of a weak solution of alum containing a few drops of carbolic acid, or the following gargle may be employed:

℞ Crystallized carbolic acid, 1 drachm;
Absolute alcohol, 5 drachms;
Essence of mint, 16 minims.

Of this solution 10 drops are added to half a tumblerful of water, and used as a gargle morning and evening. In simple catarrhal angina he prescribes the following potion:

℞ Borax, 60 grs.;
Salicylate of sodium, 30 grs.;
Decoction of marsh-mallow, 6 ounces.

Flavor with syrup. If a cure does not take place within 24 or 36 hours he then has recourse to a slightly astringent gargle, such as the following:

℞ Calcined alum, 40 grs.;
Alcohol and pure glycerin, ää 2½ drachms;
Water, 10 ozs.

To be used as a gargle four times daily. He cautions in the strongest terms against the use of concentrated solutions of tannin or alum.

THERAPEUTIC VALUE OF HÆMOGLOBIN.

Very frequently in states of marked impoverishment of the blood conditions are present, especially in chlorosis, which may counterindicate the administration of iron preparations. In such cases Dr. Pietro Castellino has tested the value of hæmoglobin, and his results, which are as follows, are reported in the *Deutsche Medizinal Zeitung* for April 30, 1891:

1. Hæmoglobin is rapidly and constantly absorbed.

2. Even in cases where there is marked disturbance of the digestive functions hæmoglobin is readily aborbed without producing gastralgia, pyrosis, meteorism, or constipation.

3. It produces a rapid reconstitution of the blood through increase in the number of the red blood-corpuscles and in the return of the normal color, specific weight, and size of the red blood-cells.

4. Hæmoglobin likewise improves the general condition of the patient by leading to increase in appetite, the normal return of the menses, increase in weight and muscular power, increase in the amount of urea, and the removal of the subjective symptoms of anæmia, such as gastralgia, dysphagia, etc.

5. When the employment of hæmoglobin is not persisted in until the blood becomes perfectly normal these effects are soon lost, and its value therefore is merely temporary. In secondary anæmia, as from carcinoma, tuberculosis, and leukæmia, if any benefit whatever follows, it is only temporary.

6. For complete cure 1½ grains daily of hæmoglobin is sufficient.

7. It surpasses the other iron preparations in rapidity of action, though, when the intestinal functions are normal, iron salts may with advantage be combined with the hæmoglobin, provided the patient can tolerate them. Their employment is especially indicated in those cases where the anæmia is complicated with digestive disorders or convalescence from febrile or other long-continued disorders.

A NEW TREATMENT OF PHTHISIS.

At the meeting of the Académie de Médecine held on April 14, 1891, Dr. Germain Sée (*La Tribune Médicale*, April 16, 1891) gave the method of treatment of phthisis which he had found most satisfactory. His method consisted in causing the patient to pass two or three hours each day in a cabinet of compressed air which contained the vapors of creosote mixed with eucalyptus. Simple inhalations of creosote and of eucalyptus have no effect, nor is the compressed air by itself possessed of any advantage, but the combination of these two methods determines an enormous absorption of creosote by the entire pulmonary surface. Creosote administered by the stomach can only be supported by patients for a few weeks at the longest, when again it is usually impossible that subcutaneous injections of creosote be continued as long as is desirable; but creosote of all antiseptic measures is best supported in the form of vapors by inhalation, and patients may live for many months perfectly well in an atmosphere highly and permanently charged with these vapors.

Dr. Sée writes that the physiological effects are most favorable, and under its influence he has seen return of appetite and improvement of general symptoms even in the most advanced cases of phthisis. Hæmoptysis, indeed, so far from being a counter-indication, has been rapidly cured, cough diminished, bronchial expectoration reduced, sputa lost their purulence and odor, and dyspnœa ceased, and auscultation shows that the bronchial râles disappeared entirely, although the râles due to the presence of cavities are naturally not affected. The compressed air charged with creosote is thus, according to Dr. Sée, a method of arresting the progress of disease, and the author states that he has notes of twelve cases of phthisis which are practically cured.

THE BACTERICIDE PROPERTIES OF BLOOD SERUM.

An explanation of the germicidal properties which recent observations have seemed to attribute to blood serum is found in a series of researches recently conducted by Dr. E. Hanbury Hankin, whose results are, analyzed by Dr. J. G. Adami in the *Medical Chronicle* for May, 1891.

In the course of his investigations upon the proteid bodies, which act as factors in the production of immunity, Hankin has passed from the study of the albumoses developed by the growing (anthrax) bacilli to that of the globulins developed by or present in certain organs of the body, and he shows that these play a most important part in the combat between the organism and the microbe. In the first place, taking the lymphatic glands of cats and dogs, Hankin extracted from them (by treatment with sodium sulphate and alcohol) a body identical with Halliburton's cell-glob-

ulins. This substance Halliburton believed to be fibrin ferment, or else inseparably connected with it. That the supposition is incorrect is shown by the fact that Lea and Green have obtained solutions apparently of fibrin ferment which caused the blood to clot rapidly, but which did not respond to even the most delicate proteid tests. And what is more, this globulin possesses a property not held by fibrin element,—namely, it has the power of killing anthrax bacilli. For if the bacilli be added to a solution of the globulin, and gelatin-plate cultures be made with drops of this after successive periods of interaction, it is found that, thanks to the proteid, the number of colonies developing in the gelatin tests rapidly diminishes,—that is to say, many of the bacilli originally added have been killed. Indeed, if the bacilli added have not been in too great quantity, all may eventually be destroyed; and whereas a drop of the mixture taken immediately after it was made, gave, for example, fourteen thousand nine hundred and seventy-eight separate growths upon gelatin, after the bacilli had been subjected to the action of the globulin for two hours, a similar drop gave not a single growth.

Boiling this cell globulin destroyed its germicidal power. If the solution was very dilute, the diminution occurring at first in the number of colonies upon the plate-cultures was succeeded by an increase, showing that the bacteria-killing substance loses its power in the act of exerting it. Nuttall, Buchner, Nissen, and Lubarsch have found an exactly similar relation to hold good for blood serum. And, as Lubarsch found in blood serum, so here, anthrax spores were apparently unharmed and produced vigorous corps. Hence Hankin concludes that the germicidal action of blood serum is due to this same or some allied substance, and he is supported by Buchner's observation that dialysis of blood serum into distilled water destroys, while dialysis into normal salt solution does not destroy its bacteria-killing power. This is a clear indication that here is a globulin, since such a body would be precipitated by dialyzing away the salts that enable it to be dissolved.

Continuing his researches into these "defensive proteids," Hankin next studied them in the rat, an animal peculiarly insusceptible to anthrax. The blood serum of this animal possesses strong bactericidal power as against the anthrax bacilli, a power which Buchner has ascribed to an, as yet, unisolated serum albuminate, and Behring to its high degree of alkalinity. As Hankin shows, both these views are right up to a certain point, for he has been able to separate out from the rat's spleen, and to detect its presence in the blood, a form of proteid which possesses characteristic alkaline reaction. At least three proteids are already known having such a reaction, and all these are albumoses,—the protomyosinose and deuteromyosinose, prepared by Kühne and Chittenden from myosin, and Sidney Martin's solution of anthrax albumoses, which, after prolonged dialysis, still remained alkaline. It may be noted in passing that the boundary-line between albumoses and globulins seems to be becoming so indefinite that no great stress need be laid upon the fact that the proteid from the rat's spleen is of the latter class.

Hankin determines that—

1. From the rat's spleen and serum a basic substance can be obtained, which differs from other known bases in that it is insoluble in distilled water and alcohol, and that it does not dialyze.

2. This substance is of proteid nature, and belongs to the globulins, though it differs from the majority of the globulins in the fact that precipitation by alcohol does not render it permanently insoluble, and that its solutions are alkaline.

3. This globulin has bactericidal properties, and to it is due the bactericidal action of the rat's serum.

4. Probably the immunity of rats towards anthrax and diphtheria is wholly or in part due to the capacity of the rat's organism to produce this substance.

5. Not only outside the body, but also within the organism, this substance can exert its bactericidal power. He was able in certain mice to ward off the evil consequences of inoculations of anthrax-cultures by injecting solutions of the globulin. It must be added, however, that with these animals, which are as susceptible to anthrax as rats are insusceptible, he was not completely successful. More work requires to be done before it can be said that this globulin can be employed as a certain cure even in early stages of the disease.

Nevertheless this does not diminish the importance of these observations in the further light they throw upon the causation of immunity. If they do nothing else, they tend to reconcile the two main opposing schools,—that of Metschnikoff, which looks upon the bacteria as being destroyed within the cells, and that of Nuttall, Nissen, and Buchner, which considers the destruction as takin

place almost wholly in the blood serum and fluids of the body. For these globulins are evidently elaborated within what may be termed facultative phagocytes, and their appearance in the blood serum would seem to be due to the breaking down of the white corpuscles, a process which we well know is continually taking place.

THE PHYSIOLOGICAL ACTION OF CHLORALAMIDE.

From a paper on the action of chloralamide, published by DR. JOHN GORDON in the *British Medical Journal* for May 6, 1891, the following conclusions are drawn:

1. The reflex irritability of the spinal cord was diminished.
2. Peripheral sensation was not reduced.
3. On frogs there were hypnotic action, slowed respiratory and cardiac actions, abolition of reflexes, and subsequent recovery of the normal condition.
4. Blood-pressure was slowly reduced with large doses.
5. Pulse-rate was not affected.
6. Respirations were reduced and finally abolished.
7. The conductivity of motor nerves was destroyed, and was not restored by subsequent washing in salt solution.
8. The irritability of muscle substance was destroyed, and was not restored by subsequent washing in salt solution.
9. The excretion of urea was increased by small doses,—.3 to .6 gramme; but was diminished by large doses,—2 to 3 grammes.
10. The excretion of phosphates was diminished with both large and small doses.
11. The excretion of the fluid constituents of the urine was not constantly affected by the smaller doses, but was diminished by the larger doses.
12. Reaction of urine was not influenced.
13. Color and odor of urine were not affected.
14. No albumen was detected.
15. Action on the skin was negative.
16. Temperature was not affected.
17. Digestion did not appear to be interfered with.
18. Hypnotic action in the healthy was induced with doses of 1.25 grammes and upward.
19. In painless insomnia the results were highly reliable.
20. In insomnia with moderate pain the results were fairly reliable.
21. In insomnia with acute pain it was not reliable.
22. The analgesic action was feeble.
23. The hypnotic effect followed usually within half an hour after exhibition.
24. The sleep induced was tranquil, pleasant, and natural, and the awakening free from confusion or depression.
25. No deferred action.
26. No craving for the drug was noticed.
27. The point of tolerance was not readily reached.
28. The doses found most readily were from 2 to 3 grammes.
29. Giddiness and inco-ordination and headache sometimes followed administration.
30. In senile insomnia, pulmonary diseases, and hysteria the results were highly satisfactory.

ETHERIZATION IN CROUP.

DR. F. BETZ contributes an article to the current issue of *Memorabilien*, which, though founded on only one case where etherization was tried as a treatment for croup, is yet of sufficient interest to merit notice. He commences by pointing out that in croup the tendency towards death is by no means commensurate always with the morbid condition of the larynx anatomically considered, the nervous system often playing a considerable *rôle*. The case he describes was that of a child, 13 months old, to whom he was called by another practitioner in order to assist in the performance of tracheotomy. The child was breathing with the greatest difficulty, expiration and inspiration being equally noisy; the hypochondriac regions were strongly drawn in at each inspiration, also the lower intercostal spaces anteriorly; the alæ nasi were working strongly, and the child kept clutching at its throat, where the larynx was very prominent, and at its ears, and twisting its head round as if there were both pain and a sense of obstruction. It would not drink or stay in bed, the face wore an anxious expression, and the head was retracted. No membrane could be detected in the throat, and there was no sound of air entering the lungs when auscultated from behind. On the left side percussion was dull from want of expansion of the lung. Altogether the case was apparently hopeless. Notwithstanding the dangerous character of tracheotomy in children so young, preparations were made for its performance, when the writer suggested that ether inhalations should first be tried. A mixture was ordered of 3 parts of sul-

phuric ether, 1 part of acetic ether, and $\frac{1}{10}$ part menthol, of which 3 drops were given as an inhalation on a folded handkerchief every quarter of an hour. The idea was by means of the vapor of ether and menthol to act on the mucous membrane of the larynx, which, as is well known, lies somewhat higher than usual in croup, and thus to contract the blood-vessels, to lower the temperature of the part, to decrease the œdema, to lessen secretion, and to allay the irritation in the larynx by the production of some amount of local anæsthesia. In addition to these, Dr. Betz had the further object in view of inducing partial general anæsthesia so as to give the child rest, and to allay the spasmodic contractions of the muscles connected with respiration. In a couple of hours a decided change for the better had taken place, the child being quieter, and some air evidently entering the lungs. The inhalations were continued, therefore, but at intervals of half an hour. Six hours later the respiration had become much less noisy, the contractions less, and dyspnœa far less urgent, enabling the child to drink. The face had regained its proper color, and the child was apparently pretty comfortable, so that there was no longer any need to think of tracheotomy. The regular administration of the inhalation was stopped, but another mixture of a somewhat similar character, containing $\frac{3}{10}$ part of menthol, was ordered, in case of any recurrence of the alarming symptoms. Fortunately the subsequent progress was so uniform that no recourse to this was required. The object of increasing the menthol was to obtain greater refrigeration, and to enable it to penetrate farther into the air-passages. The writer remarks that Trousseau used to prescribe chloroform inhalations in croup, but he is disposed to prefer his own mixture of ether and menthol. Whether such etherization has any power to loosen false membranes further experiments must show; but when tracheotomy or intubation is for any reason inadmissible in undoubtedly membranous croup, this treatment may, he thinks, very fairly be tried. The inhalations ought not to be continuous, but intermittent, and the medical man should for the first hour or two administer them himself.—*Lancet*, May 16, 1891.

THE VALUE OF ARISTOL.

In the *Centralblatt für die Gesammte Therapie* for May, 1891, Dr. Weissblum reports the results of some experiments which he made with aristol in the treatment of eczema, psoriasis, and favus. As a vehicle, he employed either olive oil, vaseline, or lanolin. With vaseline, he employed the aristol in ten per cent. strength; in a few cases in twenty per cent. The author's experience seems to show that in severe cases of psoriasis nothing whatever can be expected of aristol, and, after four to ten months' treatment with aristol, other remedies must be finally resorted to. In light cases treatment will be necessary for from two to five weeks, although even then the effects are by no means as satisfactory as obtained with pyrogallol. In one case, on the fourth day of treatment with aristol, slight symptoms of irritation appeared, consisting of redness and swelling. Three cases of psoriasis were treated with aristol in ten per cent. strength and with hydroxylamine. Hydroxylamine had to be given up in the second week on account of the irritation and pain which its employment occasioned, and although the aristol was persisted in from five to eight and eleven weeks, not the slightest influence was obtained from its administration. Pyrogallic acid had to be employed in all cases. The author concludes as regards psoriasis that where a speedy cure is a matter of indifference aristol may be used. Eight cases of eczema were treated with aristol, in all of which the aristol appeared to be satisfactory, while three cases of favus and one of alopecia areata were treated with aristol with no more effect than could be expected from the vehicle in which it was administered. So also a case of syphilitic gummatous ulcer was treated for three weeks with powdered aristol without the slightest influence whatever.

QUININE AS A CARDIAC STIMULANT.

In the *Lancet* for April 25, 1891, Mr. F. E. Hare writes that his experience has shown him that in typhoid fever there is no drug which possesses anything like the power of quinine when given in sufficiently large doses for reducing the pulse-rate. In our last issue we analyzed Mr. Hare's cases of typhoid fever treated by cold bath, which usually, according to the author's statements, reduces the febrile temperature with ease. In some cases, however, it fails, and then quinine or some antipyretic drug is indicated, which is usually given in doses of from 30 to 40 grains, as recommended by Leibermeister. Of course, anything which depresses the temperature reduces the pulse-rate and baths

have this effect in common with all the antipyretic drugs, but such reduction is almost always temporary, and in proportion, roughly speaking, to the fall in temperature, passing off as soon as the latter has regained its former elevation. In those cases, however, in which quinine had been the antipyretic given, it was gradually observed (1) that the pulse-rate, although it rose with the returning temperature, almost always failed to attain its previous frequency; (2) that sometimes it remained slower, in spite of the temperature, having gained an even greater elevation; and (3) that not uncommonly, when the drug failed altogether as an antipyretic, the pulse-rate was markedly affected. These observations seemed to point to an action on the heart independent of the antipyresis. Experiments were accordingly made to discover if this effect could be gained from doses too small to have any appreciable influence on the temperature; for if so, the independence of its action on the circulation would be established. The anticipation was fully realized.

Mrs. S. B., aged 40, was admitted to the Brisbane Hospital on the fifth day of typhoid fever. During the next three days she had nineteen baths, of from fifteen to twenty minutes' duration. On the last of these her pulse had varied between 124—with a temperature of 103° F. before the bath—and 110, with a temperature of 101.4° half an hour after the bath. Three grains of quinine were ordered every three hours. The following day (the eighth of the attack) her pulse varied between 110—with a temperature of 103° before the bath—and 100, with a temperature of 100.8° half an hour after. Ninth day of fever: pulse 108, with temperature of 103.4° before bath; half an hour after, pulse 96, temperature 102.4°. Thenceforward no further anxiety was felt concerning the pulse, which continued to range between 110 and 92, although the case did not convalesce until the thirty-first day. The effect on the pulse is not limited to a reduction in frequency; the beats become stronger, more sustained, and more distinct, and the change is especially striking in a case where the pulse had been inclined to "run." The explanation appeared to be that the drug acted as a powerful tonic or stimulant to the heart. It was determined to treat systematically in this way every case that commenced to exhibit signs of cardiac failure, and the following rule was laid down: three, five, or seven grains of quinine to be given every three hours whenever the pulse-rate commenced to range above 120.

The first case was treated on April 15, 1889. From that date to the end of the year 306 cases were admitted. Of these, 69 came under the rule. Of the 306, 18 died, a mortality of under six per cent.; but 11 of these were from perforation, 2 from profuse hemorrhage, and 3 from dysentery. In the latter, extensive ulceration of the rectum was disclosed post mortem, so that in all of the 16 death was the direct result of the intestinal lesion. Two only therefore remain to be considered. One of these succumbed to acute double lobar pneumonia, coming on suddenly before any sign of cardiac failure had appeared, and proving fatal in less than twenty-four hours. The otner was altogether unusual. The patient, a young girl, had convalesced and been allowed to get up, when suddenly the temperature rose, a painful inflammatory swelling developed in the right submaxillary region, and she rapidly sank with hyperpyrexia in spite of treatment.

The above analysis of the 18 fatal cases is enough to show that during the eight months and a half no patient died of the usual form of cardiac failure, which, under ordinary circumstances, is the most frequent cause of death. Most of this result is undoubtedly due to systematic bathing, which exerts a most powerful check upon the tendency to progressive enfeeblement of the circulation. The bath, however, occasionally fails, and it is always more potent as a prophylactic in this respect than as a remedy when once the condition is developed. Consequently quinine is especially useful in those cases admitted late in the course of the fever. Alcohol is, of course, given in the same cases as the quinine, but these are the cases in which alcohol always has been administered; and certainly the amount found necessary during the included period has been vastly less than formerly. Only quite exceptionally has more than four or six ounces of whiskey been given even in severe cases, whereas previously eight, twelve, and even sixteen ounces were no infrequent quantity.

Some points in connection with the action of quinine on the heart are worth noting. 1. The slowing of the pulse-rate is tardy in appearing, usually twenty-four hours elapsing before its effect is distinctly perceptible. 2. The effect, when obtained, is somewhat permanent, so that if the drug be withheld the pulse does not attain its previous rate for

two or three days. Both of these are in contrast to its action on the temperature, which is never prolonged beyond thirty-six hours, by even the largest antipyretic dose. 3. Its action is not limited to typhoid fever.

Mr. Hare publishes notes of one or two cases which seem to substantiate this claim. So much so that he states that he was determined to treat systematically in this way every case that commences to exhibit signs of cardiac failure, and the following rule was laid down: 3 to 5 or 7 grains of quinine to be given every three hours when the pulse-rate began to reach above 120. Mr. Hare states that he has obtained similar results in the last stages of phthisis, in croupous and broncho-pneumonia, and in surgical cases with hectic. Mr. Hare thinks that if the recognition of this use of quinine were general, by it alone many lives might be saved. He also believes that the effect on the pulse is more marked than that of digitalis, which is the only drug which can be compared in this connection with quinine, while digitalis has nothing like the effect of quinine, and in doses sufficient to reduce the pulse leads to dangers peculiar to itself. So far, then, according to Mr. Hare's teaching, from quinine being a cardiac depressant, as is stated in many works on therapeutics, it should be regared as a cardiac stimulant. In many cases of typhoid fever which are being treated with small doses of quinine, two or three grains every few hours, later on, if the pulse becomes weaker and more frequent, the drug would then probably by most practitioners be withdrawn on the supposition that it is weakening the heart's action, whereas, if Mr. Hare's position is correct, this is the very time that the dose should be doubled or even more largely increased.

THE ACTION OF LOLIUM TEMULENTUM.

DR. P. ANTZE writes in the *Centralblatt für die Gesammte Therape* for May, 1891, that he has succeeded in obtaining by distillation from the alcoholic tincture a volatile alkaloid, which he terms loliine. In the distillation residue a solid base is found, which he terms temulentin. By another method of investigation it would appear that this base is a decomposition product of temulentic acid, for which he has determined the formula $C_{12}H_{42}NO_{19}$. Experiments made with a solution of this acid with carbonate of sodium on frogs have shown that doses of from ½ to 1 grain possess marked influence on the activity of the heart, which becomes arhythmical and slow. On rabbits, after the administration of the extract, there is great reduction of temperature, and finally depression below normal with disturbance of the appetite, dyspnœa, gasping, and staggering, the temperature finally being reduced to 97°. These results also appeared after the administration of temulentin, while after loliine has been given there is no reduction of temperature and no staggering. Post-mortem examination shows great emaciation, ecchymosis, and congestion of the gastric mucous membrane. Experiments the author reports having made on himself resulted in disturbance of the sensorium and the production of gastric pain and vomiting with chills. In the treatment of poisoning with this grass he recommends emetics and cathartics, and then stimulants and excitants.

It is to be regretted that the author's experiments have not been further prosecuted, for the fact that this grass (of which the common name is darnel) is apt to grow among wheat and other grains, and thus produce poisonous results, makes it worthy of careful study.

Reviews.

A TREATISE ON THE DISEASES OF THE NERVOUS SYSTEM. By William A. Hammond, M.D., with the collaboration of Graeme M. Hammond, M.D. Ninth edition, with corrections and additions.
New York: D. Appleton & Co., 1891.

Some of the readers of the THERAPEUTIC GAZETTE who, like the writer of this article, are passing into the deep shadows of old age, have no doubt at one time or another revisited the back-country farm, where much of their childhood days were spent, and had a strange sort of feeling when they noticed the old fences, the bits of stone wall, the moss-grown logs, and the very old farm-house itself, almost precisely as they knew it when life was bright and the sun was rising higher and higher above its horizon. A field here and there, perhaps, added to the old domain, but still the homestead and its surroundings just the same. The same sort of feeling has pervaded us in reading the last edition of this book. In the early childhood of our professional life we took it in and grew upon the food it provided, and its pages, scarce unchanged, have all the familiar marks of a quarter of a century ago. In this age of rush

and progress, it is a pleasure to see some one who stands still, and we confess to a throb of such satisfaction when we read on page 74, "In a *recently* published memoir," etc. (the date of said memoir having been 1869); and, on page 327, "Quite *recently* a German author, Heubner" (*quite recently* referring to 1874); and, again, on page 689, "But quite *recently* Hitzig" (the date again being 1874). Surely the immortal Van Winkle, when he woke from his long Catskillian nap, was not more insensible to the progress of the century.

Seriously, notwithstanding some romantic chapters and paragraphs, the work of Professor Hammond, at its first appearance in its own territory, was probably the best guide to the profession in the English language, but little by little it seems to us to have slipped to the converse point in the list. The articles on "Cerebral Congestion" and "Cerebral Anæmia," for example, were, to our thinking, always largely work of the imagination; but to-day they are worse than even that. The one reports cases of hysteria, liver abscess, neurasthenia, mania, and various other affections, the binding pathological thread, cerebral congestion, according to our thinking, being a dream of the author; and, in the other, we find all the old stuff in regard to the bromides acting by producing cerebral anæmia, stuff which never had any basis in scientific research, and which has been absolutely exploded these twenty years. Is it not odd that any one should link tobacco, tartarated antimony, calomel, oxide of zinc, bromide of potassium, sodium, and lithium together in one list of similarly-acting remedies? And is it not odd that in a book published in 1891, upon nervous diseases, containing nearly one thousand pages, we should read such a paragraph as this: "Hemianopsia does not of itself indicate the existence of a cortical lesion. At best we can only suspect such, and then probably in the occipital lobe, when the condition in question is developed suddenly, as a single symptom, and with entirely negative ophthalmoscopical phenomena,—perhaps after an apoplectic attack." Is it conceivable that the writer does not know that hemianopsias differ absolutely *inter se* in their form and in their significance, and that such confounding as is contained in the above paragraph is precisely as though an author should write that "a loose fæcal passage does not of itself indicate the existence of a lesion of the mucous membranes; at best we can only suspect such," etc. To confound the different forms of hemianopsias is to be as guilty of as great a blunder as to confound the different forms of diarrhœa and dysentery. One hemianopsia means one thing, and another hemianopsia means another. Moreover, what the paragraph says is not true. A true cortical hemianopsia may be diagnosticated when it has developed slowly, and when there are pronounced ophthalmoscopical phenomena. The writer of this article has done so during life, and confirmed it at the autopsy, and any first-class neurologist ought to be able to do the same.

CYCLOPÆDIA OF THE DISEASES OF CHILDREN: MEDICAL AND SURGICAL. The Articles written especially for the Work by American, British, and Canadian Authors. Edited by John M. Keating, M.D. Vol. II. Illustrated.
Philadelphia: J. B. Lippincott Co., 1889.

Some time ago we noticed the first volume of this exhaustive work. The present volume consists of five parts, concerned respectively with "Diseases of the Skin," "Constitutional Diseases and Diseases of Nutrition," "Diseases of the Respiratory Tract," "Diseases of the Circulatory, Hæmatopoietic, and Glandular Systems," and "Diseases of the Mouth, Tongue, and Jaws." The illustrations are profuse and excellent in character. The two articles on "Scrofulosis" and "Tuberculosis," by Drs. Henry Ashby and A. Jacobi, respectively, are well worthy of the writers, and are followed by one on "Syphilis," by Dr. Abner Post, and one on "Rachitis," by Dr. Thomas Barlow and Dr. Judson S. Bury. These, with Dr. Barlow's article on "Scurvy" and Dr. Bury's on "Cretinism," form a section of great and correlative interest in which the searcher will find much new matter and some original observations.

Dr. J. Milner Fothergill's "Oxaluria-Phosphaturia-Lithuria" was the last work of that distinguished writer, and was considered by him "an attempt to gather together what is known of an interesting subject not nearly so carefully studied now as it was half a century ago, and as it probably will be less than half a century hence." This article abounds in a characteristic manner with odd information oddly applied, but with wonderful ingenuity, to prove the author's theories. It is well known that the author had his own pet theory of the gouty diathesis,—it is fully explained in these pages.

Dr. John Noland Mackenzie's article on "Nasal Obstruction," Dr. MacCoy's on "Re-

flex Cough," the articles on "Epistaxis," "Foreign Bodies in the Nose," "Tumors of the Nose," open up the section on the "Respiratory Tract." The most original article in this section is on "Purulent Rhinitis," by Dr. F. H. Bosworth. The extraordinary silence of literature on the subject of this disorder has seemed for many years—to the reviewer—totally inexplicable, and even in the article before us, where it is credited with a duration of from five to fifteen years, the chronic form only is alluded to, ignoring the fact that there is an acute purulent rhinitis,—often the precursor of the chronic form,—in general running a course of months rather than years,—presumably contagious, and characterized by diagnostic signs which render it safe to say that it has hitherto escaped notice in any work on the subject with which we are familiar.

The exceedingly extensive subject of "Diseases of the Tonsils" is discussed by Dr. Beverley Robinson. The writer takes very conservative ground in regard to diagnosis of membranous exudation upon the tonsils, and seems to believe in the possibility of a scarlatinaform rash as nominally connected in a small percentage of cases with non-contagious angina simplex. To realize the value of the article to the practitioner it must be carefully studied. In many cases such study would almost certainly result in a change of habitual practice, both in diagnosis and treatment, in which latter matter the article is an excellent guide.

Dr. H. R. Wharton's article on "Tracheotomy" is exceedingly able and well illustrated. Dr. Wharton's statistics of his own results are, in some points, exceedingly favorable, and the article may be taken as a safe and thorough guide for those undertaking the operation.

The article on "Croupous Pneumonia" is by Dr. Francis Minot. The author condemns the use of quinine in this disease as "worthless." While Dr. F. Gordon Morrill, in "Broncho-Pneumonia," advises us to abandon all poultices and wet applications, using only a jacket of cotton,—we fancy wool would be better. He begins his treatment by calomel and soda; thinks ipecac dangerous by causing too much secretion,—except in emetic doses; gives carbonate of ammonium, squills, and senega when the disease is well established. Here also quinine, which has proved itself in the hands of many men really invaluable, is ignored, though we believe that its use marks the only real improvement in the treatment of catarrhal pneumonia in the last decade.

But taken as a whole, this volume excellently represents the best practice of the day, based upon its most recent knowledge, and must hold its own in the estimation of the reader till displaced by a still more formidable competitor.

E. W. W.

HISTORISCHE STUDIEN AUS DEM PHARMAKOLOGISCHEN INSTITUTE DER KAISERLICHEN UNIVERSITÄT DORPAT. Herausgegeben von Dr. Rudolf Kobert, Professor der Geschichte der Medicin und der Pharmakologie.

No. 2, Halle, Verlag von Tausch & Grosse, 1890.

HISTORICAL STUDIES FROM THE PHARMACOLOGICAL INSTITUTE AT THE UNIVERSITY OF DORPAT. Published by Dr. Rudolf Kobert, Professor of the History of Medicine and Pharmacology. No. 2.

When the first volume of Professor Kobert's historical studies was published, some few years ago, it was felt that, although their value was inestimable, the fact that they dealt so largely with things of the past and so little with the present would prove a source of objection to their popularity in these times when it is all that one can do to keep up with the constant advance of any one specialty. In the preface to this second volume the editor admits that this has been his experience, and that the number of copies of the first volume purchased was so small as to be insignificant when compared with the expense of publication. In the present volume, consequently, historical facts have been relegated to a secondary position, and especial attention has been given to the practical application to the sick-bed of facts determined by recent pharmacological investigations.

The volume before us contains two elaborate papers,—the one on "The Action of Simple Bitters," by Wladimir Ramm, and one on "Bryonia Alba," by Abraham Mankowsky. The author's studies on simple bitters include experiments with cetrarin, exostemmin, absinthin, quassin, and columbin. In the GAZETTE for October 15, 1890, we published the author's conclusions as to the action of cetrarin.

Exostemmin is a bitter principle extracted from the exostemma floribundum, a plant which already has attained a certain notoriety as the false cinchona bark, a substance which possesses a greater amount of bitterness than any other body, marked taste being possessed by solutions of 1 part to 60,000. Exostemmin, like cetrarin, is not soluble in hot water unless a little sodium bicarbonate

is added. Experiments made with this substance prove that, given intravenously, 1/3 grain of exostemmin for every two pounds of body-weight produces death with certainty in rabbits, cats, and dogs, the symptoms being vomiting, diarrhœa, dyspnœa, insensibility of the extremities, and finally slowing and depression of the pulse. When examined post mortem there is found marked hyperæmia of the entire intestinal tract, death apparently being produced by general central paralysis. Given in smaller doses it greatly increases intestinal and gastric peristalsis, is without marked action on the heart or blood, and acts as a slight stimulus to the secretion of bile. Experiments made on a number of healthy individuals with all these bitter principles showed that the same general effect is observable in each, that they in all cases increase the number of leucocytes and red blood-corpuscles, improve the appetite, and regulate the bowels.

Dr. Mankowsky's work with bryonia alba was devoted in the first place to the recognition of the chemical properties of bryonia and the determination of its physiological action, with the surprising result that the substance, bryonin, which had previously been regarded as so extremely toxic, is practically non-poisonous in frogs, dogs, cats, and rabbits, producing only in some cases slight vomiting. So also on the isolated heart and on the exposed intestine bryonin was found to be without action. Such a result having been obtained with what was supposed to be the active principle of bryonia naturally led to an examination of the properties of the dried root of bryonia alba, with the result here that extreme toxicity was found to be possessed by watery decoctions of this root. Experiments with bryonidin, on the other hand, show that the lethal dose amounts to about 1½ grains for every two pounds of body-weight, death being due to paralysis of the central nervous system.

This volume of Kobert's communication, devoted to the substances above referred to, containing 182 pages, scarcely permits of satisfactory analysis in the space which we can devote to it.

Those who are, as we hope all should be, interested in the history of pharmacological progress will find in these works a most elaborate and satisfactory compilation. Those who are interested only in the clinical application of pharmacology will find that this branch also of science has not been neglected.

TEXT-BOOK OF BACTERIOLOGY. By Carl Fraenkel, M.D., Professor of Hygiene, University of Königsberg. Third Edition. Translated and Edited by J. H. Linsley, M.D.
New York: Wm. Wood & Co., 1891.

A physician who, at the present time, is ignorant of bacteriology is seriously handicapped in his combats with disease, and although it is not to be expected that the general practitioner should be an expert in bacteriological research, he should, at least, possess some familiarity with the methods and results of such studies. Many of the more serious diseases have now been distinctly proved to be due to the presence of pathogenic organisms, and the list of such maladies is becoming daily a larger one. At present there is no complete work that we are familiar with on bacteriology published in the English language on this side of the Atlantic, and the fact that Professor Fraenkel's work is recognized as a text-book in the Berlin Institute of Hygiene, and that it has already been published in six different languages is sufficient testimony as to the merit of the work. Although Professor Fraenkel does not claim complete or exhaustive discussion of the subject, in the examination of his work its completeness and thoroughness are its most striking characteristics. Nothing of importance seems to have been omitted, while clear descriptions of modes of investigation and methods of breeding the organisms, with their methods of transmission, and descriptions of the non-pathogenic and pathogenic bacteria, together with the investigations of air, soil, and water, leave nothing to be desired. The chapter on cultures is a specially satisfactory one, not only being perfectly clear, but in describing methods which are capable of performance without the necessity for elaborate apparatus. It is a great pity, however, that such a work as this could not have been illustrated with drawings of the different organisms described. The translator has done his work well. The English is unexceptionable, and the change which the translator has made from the lecture style to the didactic is an improvement. It is needless to say the publishers have left nothing undone to enhance the appearance of the work.

TAKING COLD. By Franke H. Bosworth, M.D., etc.
Detroit, Mich.: G. S. Davis, 1891.

This is an exceedingly able little monograph, and its author's reputation is fully sustained in its pages. Dr. Bosworth considers it as singular that no one seems to have paid

any attention to the simple subject of "taking cold," disastrous as its consequences often are. "They confuse," he says, "the idea of taking cold with that of absolute cold, regarding the penalty of which they suffer as the result of an exposure to cold." Now, while Dr. Bosworth thinks these people are all wrong, and has another opinion of his own, others may differ from both, and it seems never to have occurred to any one that in catching cold we do but catch, through the medium of a reduced vitality, the prevailing cold, contagion, or whatever it may be called that is in the atmosphere at the time. Colds follow different types at different times, but the cold of a certain autumn or spring or winter will differ from the cold of the next season very materially, and any one seeing large numbers of people professionally will readily and early in a season learn the type of its cold. All his cases will have similar symptoms, while at another season the same similarity will exist in his cases, but the type of cold be quite different. Cold-checked perspiration, etc., are only the accidental means by which the poison gains access. No wonder that in the presence of an influenza epidemic all colds are called influenza, for there are no other. It is the prevailing cold, it is the only one existing at the time, and so the one "caught," for checked perspiration will not account for "colds." There is no time when perspiration is so frequently checked as in summer, and at no time is there so little complaint of "colds," leaving out the rose- and hay-fevers, which again fairly support our view.

Dr. Bosworth thinks that mere lowering of temperature very truly does not do any harm. It is only by lowering a portion of the body, by being, in short, "in a draught." Of the reason why draught is so dangerous he gives us several illustrations. A draught of air moderately low in temperature and containing moisture is the great cause, our author tells us, of taking cold; but why, is a question "not easy to explain," but "remaining as a matter of constant experience." The author's explanation of the action of draught only explains why the nasal mucous membrane becomes dry and swollen. To explain a true progressive cold he should go further, or admit that his explanation only gives us the *rationale* of the weakened spot, the swollen and debilitated membranes, on which lodges the contagion of the "cold," and from which it spreads. Being swollen, they arrest more completely and hold whatever particles are in the inspired air, and being weakened and their normal balance of moisture being disturbed, they offer no resistance to the disease-germ. Exactly the same thing exists in regard to the diphtheritic membrane, which, in those notably-exposed, attacks in two ways,—either by constant exposure to the cause,—viz., an individual suffering from diphtheria,—or by exposure to changes of temperature after such exposure. In either case the poisonous germ gets a foothold,—in the former case, slowly; in the latter, very rapidly.

But we have no intention of underrating the value of Dr. Bosworth's remarks, even if in one point we are disposed to differ, for every page is full of instruction, and nothing better has ever been written on the subject of "clothing" than his chapter under that heading. We believe he is perfectly right in his view that we dress too heavily; that we allow nothing for the hardening process which nature is capable of; that our underwear should be of medium weight and all wool, and worn about the same all the year round. His condemnation of silk is well merited; fashion and its high price are its only recommendations. True, Dr. Bosworth would do away with our hats; but he forgets the sun, in thinking only of the cold. We could do away with the "chimney-pot" cheerfully, but we would have to have a turban or something. Chest-protectors, too, are fully exposed, and thick shoes, for, as he very sensibly advises, the soles should be thick, the uppers as light as is compatible with keeping the feet dry; in short, the reader will find the book a very excellent guide and a mine of original ideas. E. W. W.

INTERCOLONIAL MEDICAL CONGRESS OF AUSTRALASIA. TRANSACTIONS OF SECOND SESSION. HELD IN MELBOURNE, VICTORIA, JANUARY, 1889.

Published under the direction of the Literary Committee. Melbourne: Stillwell & Co., printers, 1889.

This ponderous volume is principally interesting to the reviewer in connection with one paper,—viz., "The Nervous Substratum of Influenza." This volume is composed of papers *read* in January, 1889, or nearly a year before the outbreak of influenza in Europe, and the article begins by reference to a previous article by the same writer in the *Australian Medical Journal* for October, 1885, "Upon the great epidemic of influenza which had visited Australasia during that year, and which was locally known among our public as 'fog fever.'" As we read fur-

ther that it had appeared in May, 1885, reaching its acme for the year in August, and that it had recurred each subsequent year in the winter months, and that it grew with each year, up to the date of the article in 1889, in severity, we are struck with the idea that this is the origin of our present epidemic, and a perusal of the article as a whole confirms the idea beyond a doubt; in fact, the author's analysis of nerve-supply, in connection with symptoms, applies perfectly to the disease as we know it by sad experience. The theory advanced is that the nerve relations of the pharynx and nasal mucous membrane, if studied carefully, supply us with the means of understanding all the various varieties of influenza. The author gives us a tabulated statement of the nerves, their distribution and reflexes, and of the symptoms which would naturally follow upon their irritation, and then compares this with the actual facts as witnessed in influenza, and makes out a fairly good case for himself. An equally good case can, we think, be made by the advocates of the view that the disease is a progressive lesion of nerve-trunks; in fact, a specific neuritis.

In connection with this article, we came across a discussion of typhoid fever in another part of the volume, wherein the same writer describes a class of cases of frequent occurrence in the colonies in the past few years, resembling typhoid fever, but differing also in some important points. They are evidently cases of true continued catarrhal fever, of exactly the same character as those with which we have become familiar in the past three years,—*i.e.*, they are but a more complete and continuous form of influenza,—antedating its epidemic occurrence by over a year.

Many of the papers in this report are of great value, and show a high standard of education, but a thorough review of them is quite impossible, the volume being immense in size and the papers very numerous.

E. W. W.

THE PHYSICIAN'S LEISURE LIBRARY. ELECTRICITY; ITS APPLICATION IN MEDICINE. By Wellington Adams, M.D., Lecturer on Electro-Therapeutics, University Medical College, Kansas, etc. In two volumes.

Detroit, Mich.: Geo. S. Davis, 1891.

In the first volume the author describes the electric current, its modes of production, transmission, and measurement, together with the numerous electric and magneto-electric instruments in use at the present day. He describes the different currents and their modes of action, and directs the novice in the choice of the proper agent. Volume II. deals with cells, batteries, and instruments, and is the one of more interest to the practitioner. The author explains that, in almost every branch of medicine, electricity, as a therapeutic measure, is of great value. He thinks that gynæcology and diseases of the respiratory and auditory passages offer the best fields for its use, though he by no means overlooks its applicability in paralyses and muscular atony. These books, while to some extent necessarily technical, are, nevertheless, so plainly elucidated that a student, with but little knowledge of electricity and its applications, should have no difficulty in grasping the author's ideas. The explanation of the reaction of degeneration, in the chapter upon "Electro-Therapy," is the clearest and least-puzzling exposition of this rather complex action which we have yet seen. The plates, with which both volumes are profusely illustrated, are well executed, and many diagrams aid to render the text clear. W. D. G.

Correspondence.

THE THERAPEUTIC VALUE OF CACTUS GRANDIFLORUS.

To the Editor of the THERAPEUTIC GAZETTE:

DEAR SIR:—I am very glad to see Dr. Aulde's article on "Cactus Grandiflorus," in the May issue of the THERAPEUTIC GAZETTE, especially as it comes immediately upon the heels of Professor John V. Shoemaker's sneering remarks, in his late work on therapeutics, regarding those who use the remedy. Cactus is beyond any question one of the most valuable remedies we possess in the treatment of diseases of the circulatory and nervous systems. I have used cactus since 1874, and can endorse all Dr. Aulde says of it. Heretofore I have used it principally in chronic diseases, but during the past two years have used it in continued fevers where the pulse was especially rapid and weak. The effect of the remedy in these cases has been very satisfactory, the pulse almost invariably becoming slower and the heart gaining in power. I am now treating two cases of cardiac dilatation, with anasarca and œdema of the lower extremities, in one of which there is valvular disease with dyspnœa, and in both of which the swelling of the feet and legs was

enormous. Digitalis, diuretics, and cathartics had no permanent good effects. I gave each case tincture of apocynum alone, with but temporary benefit. I then gave each of them cactus and apocynum, five drops of each t. i. d., since which time improvement has been rapid and steady. They have now been using these two remedies two months, and the swelling has almost entirely disappeared, while in the one case the dyspnœa is very much relieved, so much so that the patient can lie down in bed to sleep instead of sitting up as formerly. These patients are 70 and 64 years old respectively. I have found cactus an admirable remedy in many cases of cold extremities, depending wholly or partially upon a debilitated condition of the system, following upon sexual excesses of many years' duration. In some cases of weakened or failing memory, depending on nervous debility, cactus has been of much value.

Since publishing my letter on "Cactus" in the *Medical News* some two or more years ago, I have had many communications from physicians all over the country, some commending, others condemning it. Those who saw no good effects from its use I invariably found had used some unreliable preparation. I use a tincture made from the recent plant, in the proportion of four ounces to the pint of alcohol. Any one who expects good results from inferior preparations will be disappointed.

Respectfully,
C. L. GREGORY, M.D.

YREKA, CAL., May 22, 1891.

Notes and Queries.

PHYSIOLOGICAL EFFECT OF BATHS IN TYPHOID FEVER.

DR. KURKUTOFF, who has examined the physiological effects of baths administered to typhoid fever patients in Professor Manassein's clinic in St. Petersburg, finds that such baths exert only a slight effect on the assimilation of the fatty constituents of foods, which, as in other fevers, is notably less than in healthy persons, and indeed varies directly with the gravity of the case; but there seems to be a good deal of difference as to the power of assimilation of fatty matter in different cases, probably depending on the functional disturbance in the bowel and on the amount of the individual peculiarities of the patient. In the graver cases the effect of the baths was to improve somewhat the assimilation of fat to the average extent of nearly four per cent. In slight cases, however, the effect was, apparently at least, to diminish the assimilation to the average extent of rather more than six per cent.—*Lancet*, May 9, 1891.

A READY WAY OF DEMONSTRATING THE PRESENCE OF ARSENIC IN WALL-PAPER.

Put a small piece of the paper into strong ammonia water. If arsenic be present a bluish color will be developed. Since copper gives a similar reaction, as a further test moisten a crystal of nitrate of silver with a drop of the fluid. If the color be due to arsenic, a yellowish deposit will be formed on the crystal.—*National Druggist*, May 15, 1891.

KOLA NUT IN OBSTETRICS.

In the *Lyon Médicale* for March 15, 1891, DR. CHAMBARD-HENON reports the case of a woman who had had three children, and at each delivery suffered from alarming syncope and cardiac palpitation, the action of the heart being so feeble in one case as to occasion the death of the fœtus. On a subsequent delivery Dr. Henon administered a number of chocolate tablets of kola nut with the claim that symptoms of syncope were entirely prevented.

THE HEAVY OIL OF TAR.

The great celebrity which has been acquired by various emulsions of this substance as antiseptics, especially since the recognition of the virtues of creolin, which had the prestige of a European recommendation, has aroused considerable interest concerning the nature of these preparations, and many inquiries as to the component parts on which their undoubted antiseptic properties depend.

The common base of all of them is a by-product of the distillation of bituminous coal for the manufacture of illuminating gas, and this is known to the trade or in the arts as the "heavy oil of tar."

The discovery of its antiseptic properties was accidental, and it gradually acquired use as a destroyer of vermin on plants and animals; particularly as a wash for sheep it is used to destroy the scab, a very obstinate parasitic disease, and one much more obsti-

nate to treat than ticks, with which they are apt to be infested.

From such uses it was introduced into medicine some ten years ago, and the principal changes since that time have been in the methods of solution, or rather of emulsion, of the oil, so as to make it miscible with water.

Chemically, the heavy oil is a creosote oil, containing cresol, xylol, naphthaline, and various other phenols and hydrocarbons, all of which are of strong antiseptic properties.

The first preparation which we remember as sold and recommended for surgical use was termed phenyl, and was tried extensively in Boston some ten years ago, and, after careful trial, it was recommended as a safe and valuable antiseptic by some of the staff of the Massachusetts General Hospital. We do not know whether it is now in the market, but in place of it another similar preparation, named the royal disinfectant, appeared, which seemed to be precisely like it in physical properties and therapeutic effects, while quite recently another preparation, or emulsion of the heavy oil, termed sulphonaphthol, has been put on the market.

Although the earlier of these preparations had earned a place in surgical practice, yet they were for a time completely eclipsed by the introduction of the use of corrosive sublimate, thymol, and other chemicals, which, being of known composition, could more readily be studied, and being without trademark or patent, of course obtained more favor in the profession.

The various grave disadvantages, inconveniences, and dangers of the use of sublimate, however, led to a search for a reliable and safe substitute, and some two years ago a firm in Hamburg put on the market a preparation called creolin, which is in every respect similar to the other emulsions of the heavy oil of tar, although it is claimed that it has superior efficacy, owing to the fact that it is derived from a variety of coal found in England, which differs more or less from coal found in less favored lands.

Creolin immediately acquired a high reputation in Germany, which was evident from the various articles which filled and are yet filling the medical journals in reference to it. As is well known, the fact that a medicine is protected by a trade-marked name, and by secrecy as to its composition, does not prevent the most scrupulous in this country from employing and recommending it, provided that it is a foreign medicine, and thus creolin received a great deal of attention. The other preparations of the same nature—phenyl, royal disinfectant, and sulphonaphthol—also came into renewed demand. The formula of the latter preparation has been published, and it appears that it is made by emulsifying the heavy oil with a mixture of sulphide, and of resinate, of sodium, and to this mixture are added large amounts of alpha- and beta-naphthol.

More or less alcohol, and also some form of alkali, are used in all of these preparations, but we have been unable to find any published formula of any of them except sulphonaphthol, although we are persuaded that a knowledge of the composition of any of these substances would greatly increase its use among physicians, who, not unnaturally, like to know what they are using.

One great advantage of these preparations is their comparative cheapness; the principal component part is a substance which, until recently, was a waste product and a nuisance, and at present the principal cost of the various preparations is in the labor and expense of manufacturing and selling them, so that by the can or barrel they can be bought very cheap for hospitals.

They also are not poisonous; there is, therefore, no danger of harm resulting from absorption, in any strength in which they can be used externally. Employed in intestinal disorders, and even internally, they have been used where it was desirable to prevent fermentation or putrefaction in the alimentary canal.

Even in the full strength neither of these preparations of the heavy oil is corrosive, and this is not only an advantage to the patient but also to the physician, who finds his hands kept in excellent condition by frequent immersion and ablution in the oleaginous or slightly saponaceous solution.

The same qualities make such solutions extremely useful in a great deal of obstetrical and gynæcological work in washing, douching, in irrigating the field of an operation or in washing out a bladder.—*University Medical Magazine*, February, 1891.

THE EFFECTS OF OVERDOSES OF EXALGINE (METHYLACETANILIDE).

In the *Lancet* for March 7, 1891, Mr. Arthur Conning Hartley reports the following cases of overdoses of exalgine:

Case I.—Mrs. C., aged 27, married, had been subject to severe periodic attacks of

neuralgia over the right orbito-temporal region for the last five years, and, as nothing had done her any good, exalgine was tried. The attack began at 11 A.M., and increased in severity. At 1 P.M. she took a 3-grain dose of the French preparation (MM. Brigonnet and Naville), and the same dose was repeated at 2, 3, 4, and 6 P.M., without giving any relief or discomfort. At 9 P.M. she took 3 grains more, and almost immediately afterwards felt absolutely powerless. This lasted for five minutes, the patient remaining quite conscious. She compared the sensation to that of taking chloroform before she was quite "under." At 12.45 A.M., the pain still being very severe, she took a seventh dose, and in fifteen minutes felt a feeling of impending death, could not speak, gasped for breath, pallor intense, dilated pupils; the limbs became quite rigid, heart palpitated, felt utterly powerless, and broke out into a profuse perspiration. By the aid of fresh air, stimulants, etc., the attack passed off in fifteen minutes, leaving her very prostrate, with ringing sounds in the ears. The pain, which frequently lasted only this length of time, now left her. Other functions remained normal, and no rash developed. This happened between her menstrual periods.

CASE II.—Mrs. G. had been taking 2-grain doses at intervals for a neuralgic headache, obtaining relief, though sometimes feeling slightly faint, but by mistake an undetermined overdose was taken. She soon experienced a feeling of complete prostration, her limbs became powerless, though not rigid, felt as if she was sinking through the bed, slight perspiration, and thought she was dying; breathing faint and shallow, and nearly pulseless at the wrist. Mustard, hot bottles, and stimulants brought her round, but she felt very weak for many days afterwards.

THE EFFECTS OF STYCHNINE ON THE STOMACH.

The effect of nitrate of strychnine on the functional activity of the stomach has been recently made the subject of a careful research by DR. GAMPER, of St. Petersburg, who employed for the purpose of his experiments four healthy young hospital assistants. He found that strychnine increased the amount of gastric juice secreted, the general acidity, and the quantity of free acid in the secretion. It also hastened the absorption from the stomach, and strengthened the mechanical movements. Its effect, too, continued for some time after its administration had been stopped. Like many other Russian observers, Dr. Gamper seems to have been highly impressed by the value of strychnine in chronic alcoholism, declaring that it is the most effective of all drugs in such cases. The thesis contains a long list of references to the literature of stomach affections, published in six or seven languages during the last ten years.—*Lancet*, April 18, 1891.

NEW PROCEDURE IN ABSCESS TREATMENT.

The treatment of chronic or cold abscess by the method of aspiration and injection of antiseptic solutions, such as iodoform dissolved in ether, is a favorite plan of some French surgeons, and is the one usually adopted for some time past in the wards of M. Verneuil, now the senior professor of clinical surgery in the Paris faculty; but it appears to have been reserved in this country to Dr. Piéchaud, of Bordeaux, to have adapted the method with success to the treatment of acute inflammatory abscesses. Instead of the time-honored free incision of the most dependent part, M. Piéchaud aspirates the abscess, after which he injects a solution of 1 to 1000 of corrosive sublimate. For the past ten months he has invariably adopted this method in his hospital practice, and, he declares, with marked success. Even if the skin over the seat of the abscess be thinned and undermined, this is no bar to the procedure, for which he claims as advantages that it is less painful, leads to more rapid healing, and leaves no traces of scar.—*Lancet*, April 18, 1891.

THE LOCAL USE OF OIL OF WINTER-GREEN IN RHEUMATISM.

The *Mercredi Médical* mentions that Dr. Staples, of England, has for the past four years been using oil of winter-green in the local treatment of rheumatic affections, subacute and chronic. He employs a liniment of equal parts of oil of winter-green and olive oil, afterwards keeping the member covered, and says that the pains disappear at the end of from four to six hours. It is, moreover, efficacious in the chronic form. Of over a hundred patients so treated, two only have received no benefit.—*New York Medical Journal*, May 2, 1891.

RELAPSES IN MEASLES.

According to PROFESSOR SENATOR there are no positive records of the frequency of recurrences of measles and scarlet fever. Both relapses and recurrences, the author believes, are not infrequent. He reports five cases of relapse of measles. The first patient was a girl 10 years of age. Twenty-two days after the onset there was a second attack. It was of greater severity than the first. The second and third patients were two brothers, aged 8 and 4 years. The second attack occurred nine weeks after the first. The fourth was a girl of 13 years, the two attacks being four weeks apart. Her mother was the fifth patient, and was ill at the time of her daughter's second attack. The last four cases, it will be observed, occurred in two families. It seems possible that there was some family predisposition to the recurrence of infectious diseases.—*New York Medical Journal*, May 16, 1891.

A SIMPLE TEST FOR DETERMINING THE PURITY OF OLIVE OIL.

In the *Répertoire de Pharmacie* for February 10, 1891, M. BRULLE describes some experiments which he has made with the idea of recognizing, by the aid of nitrate of silver, the presence of various other oils of different seeds in olive oil. The agent which he employs is a solution of 25 parts of nitrate of silver in 1000 parts of ninety-five per cent. alcohol. He adds 65 parts of this reagent to 52 parts of the oil to be examined, and then places the tube in a glass vessel containing boiling water, while observing the changes in colors which are produced in the oil in the tube. If the oil is not perfectly limpid, it is first necessary to filter it. According to Brulle this reagent permits, by the different colors produced, of the recognition of the purity of olive oil. With pure olive oil obtained by the first pressure—so-called "virgin olive oil"—a beautiful greenish tint is produced. Oils obtained by the second or third pressure darken slightly or become of a pale red, finally becoming intensely green. If the oils are highly colored, the final tint is likewise a beautiful green, but this reaction is only obtained after fifteen or twenty minutes boiling. Pure cotton-seed oil becomes absolutely black, and the oil of sesamum assumes a brownish-red color, which remains; oil of colza and of rapeseed remain a greenish-yellow color. The liquid becomes turbid, and is thus very readily recognized from the reaction with olive oil. With this reagent Brulle claims that with a little practice one can readily recognize the adulteration of olive oil with these different oils even when the latter are in no larger amount than in five or ten per cent.

INFLUENCE OF ACUTE MERCURIAL POISONING ON THE ELIMINATION OF PHOSPHORIC ACID AND CALCIUM.

From a number of experiments made by DR. PAUL BINET as to the influence of acute mercurial poisoning on the elimination of phosphoric acid and calcium, the following conclusions are drawn (*Revue Médicale de la Suisse Romande*, No. 3, 1891):

Mercurial poisoning does not increase the amount of phosphoric acid and calcium in the urine, but, on the contrary, a diminution will be generally produced.

The quantity of urine increases in slight degrees of poisoning, but diminishes in the grave forms with ultimate anuria; albuminuria is the rule; glycosuria is frequent.

The percentage proportion of calcium in the fæces is not subjected to any notable modification.

The disassimilation and elimination of calcium salts is but slightly influenced in mercurial poisoning.

READY TREATMENT OF FOREIGN BODIES IN THE NOSE.

DR. T. J. SLATON describes a simple pneumatic method of removing foreign substances from the nasal cavity of children. The operator places a thin cloth over the child's mouth; applies his finger to the nostril not containing the substance, pressing sufficiently to close its lumen; and then, putting his mouth to the child's, he gives two or three strong puffs. Dr. Slaton has employed this method for the last ten years, and affirms that in nine cases out of ten the substance will fly out.—*New York Medical Record*, January 17, 1891.

THE ACTION OF ARISTOL.

In the *Deutsche Medizinal Zeitung* for May 18, 1891, DR. SCHMITT writes that he has now tested the use of aristol on forty different patients. In ten cases of soft ulcer it proved absolutely hurtful. There was no improvement in the character of the ulcer, and the process even rapidly extended. So also he found it a total failure in two cases of gonor-

rhœa, intertrigo, in syphilitic ozæna, in ulcerated facial cancer, and in lupus, even although aristol has been claimed to cure the latter disease. In the case of inguinal bubo, after four days' treatment, its use had to be suspended on account of the dangers in rapid extension of the disease. Favorable results were obtained in ulcerated lymphatic glands of the neck and in bed ulcers. So also in psoriasis its action was comparatively prompt and without any unfavorable effects. In general, however, Dr. Schmitt regards his results with aristol as by no means successes, and certainly it is not in his opinion to be compared with iodoform, and he thinks that, like so many other new remedies at first so enthusiastically praised, aristol will within a short time pass into obscurity.

DEATH AFTER A DOSE OF SALOL.

Salol is usually considered a tolerably innocuous drug, but there are not wanting clinical observations which tend to show that, under certain circumstances, at least, its use may be followed by dire results. Thus a case was some time ago reported by Aufrecht and Behm, in which death followed its use in acute endocarditis, and more recently Dr. Chlapowski has published in a Bohemian medical journal an account of a case in which a similar fatal result followed a 15-grain dose ordered to a patient who was suffering from severe gastric symptoms, and who was being examined by Ewald's method. After taking the salol, the patient became restless and unconscious, the pupils dilated, the pulse became irregular, there was constant vomiting, and the urine became dark and contained salicylic acid. Death occurred twelve days later. At the necropsy there were found gastritis and hemorrhagic enteritis, a gastric ulcer cicatrized at the cardiac end, chronic endometritis, and a cyst of the ovary. No doubt was entertained that the salol had caused the symptoms of poisoning.—*Lancet*, May 23, 1891.

THE ACTION OF THE TINCTURE OF CLOVES IN TUBERCULAR AFFECTIONS.

The investigations of Jalland, Cadeac, Meunier, Frendenreich, and others, as to the antiseptic action of different balsams resembling in constitution the tincture of cloves, led Dr. Mannotti to test the influence of the latter on the progress of tubercular affections (*La Presse Médicale Belge*, No. 12, 1891).

After determining that the tincture of cloves considerably retarded the development of the bacillus tuberculosis (mediums previously impregnated with this tincture no longer serving for the culture of this bacillus), he treated eighteen cases of local tuberculosis, consisting of cold abscess and fistula, chronic adenitis, and fungous arthritis, by injections of a ten per cent. emulsion of cloves in olive oil. The results obtained by the author led him to conclude that this remedy is one of the best which we possess against tuberculosis. Especially is it valuable, according to the author, in cold abscesses, which are invariably affected in the most evident manner by these injections. Fungous arthritis and adenitis, on the other hand, are not so amenable to this treatment, but are influenced much more favorably than when an injection of iodoform, ether, or emulsion of iodoform, is made. Some cases are stated to have improved even after iodoform had been discarded as useless. Fistulæ, even those most rebellious to treatment, are said to have been readily cured. Nevertheless, the author admits that his results are in many cases not permanent, since it is impossible to free patients from the cause of their disease; but, notwithstanding, the results obtained so far seem to encourage further trial of this remedy. The operative procedure is very simple, not differing in any respect from similar technique when ethereal solutions of iodoform are employed. The dose is in proportion to the extent of the abscess or the fistula to be treated, and has in the author's hands reached the large amount of 320 minims without producing harm.

TRIGEMINAL NEURALGIA AND IODIDE OF POTASSIUM.

In the last number of the *Neurologisches Centralblatt* reference is made to some interesting facts related by Dr. S. Ehrmann as to the occurrence of severe facial neuralgia after the administration of even small doses of iodide of potassium. In the first case mentioned, the patient, a strong workingman of 35, suffered most intense pain in the forehead and in the teeth, with sensitiveness over the whole distribution of the fifth nerve, after taking fifteen grains of the drug. A second patient, after taking thirty grains, had much pain in the region of the upper jaw, with pain and tenderness in separate branches of the nerve, and also œdema of the eyelids on the left side. A third and a fourth patient also suffered from similar symptoms after similar doses. There were associated in all

the cases much lachrymation and injection of the conjunctiva, but the symptoms rapidly vanished, and did not appear on a further administration of the drug. The cases are not only interesting, but important, for it is desirable to know as much as possible regarding any peculiar effects likely to be produced by a drug which is so frequently administered as is iodide of potassium.—*Lancet*, May 21, 1891.

TREATMENT OF CHRONIC INFLAMMATION.

To remove the products of inflammation when occurring in orchitis, epididymitis, the lymphatic glands, or the articulations, DR. LAND (*Revue Internationale de Bibliographie* for March 25, 1891) recommends the use of hot compresses, stating that this measure has always given him the best results even when other remedies had proved inefficacious. These compresses should be applied frequently for ten or fifteen minutes several times during the day, taking care, however, that during the applications one compress should not be allowed to remain more than two minutes. The compresses should be immersed with water at a temperature from 104° to 140° F. They should not, however, be used during the acute stages of inflammation.

THE ADMINISTRATION OF QUININE TO CHILDREN.

The difficulty of giving quinine to children, especially when it is desired to administer somewhat large quantities, has of course frequently been remarked. In order to obviate this, it has been proposed by various physicians accustomed to practise among children to order external applications, either in the form of ointments or lotions, with the view of getting the quinine absorbed by the skin, and several continental writers have reported that this system has given good results in their hands. The amount of quinine absorbed under these circumstances, however, was not known, contradictory views on the subject being entertained, while many of the best works on children's diseases omitted all mention of the external form of administration. DR. TROITSKI recently undertook a long series of observations in the children's department of a poorhouse with the object of ascertaining what was the best form of external application and how far absorption is possible under these circumstances. His experiments, which were ducted on healthy children, about fifty in number, are published in the current number of the *Vrach*. He made some trials with ointments of which the bases were vaseline, lard, or lanolin, but very soon discarded this form of application, as he found that, in order to get any appreciable quantity of the drug absorbed, it was necessary to spend a long time rubbing in the preparation, which was not only tedious to the operator but very fatiguing to the child. Contrary to what most of the writers on the subject have advised, the region of the body selected for the application was the back of the thorax. Solutions of quinine were then tried, with rather more success, 1 part of the hydrochlorate of quinine being dissolved in 30 of rectified spirit, or in 20 of spirit and 10 of glycerin. Of this a teaspoonful or a teaspoonful and a half was rubbed in twice a day until the skin became quite dry, the precaution having been previously taken of washing the child well. The urine was examined both by the chlorine-water and by the iodine tests, and observations made of the comparative results in the same children. The conclusion come to was that, though the drug is undoubtedly absorbed by the skin from such solutions as were used, the amount was so small and uncertain as to render it impossible to administer the dose that may be desired by the external method. The good effects that are said to have been produced in fever by the lotions, Dr. Troitski would ascribe, mainly, at least, to the refrigerating action of the spirit on the skin.—*Lancet*, May 16, 1891.

TREATMENT OF ORCHITIS BY REFRIGERATION.

In his inaugural thesis DR. DE LA VALLE reports the results of the treatment of orchitis employed in the service of Dr. Du Castel (*Journal de Médecine;* April 10, 1891). This process consists in painting the scrotum with a camel's-hair pencil dipped in the chloride of methyl, the operation to be repeated twice daily. It is stated that immediate and considerable relief ordinarily follows the very first application, even in cases where the inflammation is violent, and where the patients hitherto have been confined to the bed. The average duration of the treatment was seven and a half days; the average time the patients remained in the hospital eleven and a half days. This treatment is extremely simple, and does not necessitate the employment of any other medicinal treatment, whether internally or by external application.

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Original Communications.

THE DIAGNOSIS OF PREGNANCY IN THE EARLY MONTHS.

ABSTRACT OF A CLINICAL LECTURE.

By Charles Jewett, M.D.,* Brooklyn, N. Y.

GENTLEMEN:—Little reliance is placed by most practitioners upon the signs of pregnancy in the early months. The patient who at this time propounds the question whether or not pregnancy has begun is usually dismissed with the protest that it is yet too early for any positive assurance in the matter, and this is entirely in keeping with the teaching of most writers on the subject. It is not my aim in these remarks to add anything new to our resources for diagnosis. A brief review of the signs of early pregnancy will show that the means already familiar are in the vast majority of cases sufficient for the recognition of pregnancy in the early months. Of first importance is the methodical plan of examination. Diagnosis in the earlier stages of gestation, as in most other lines of practice, rests upon no one sign alone, but upon the cumulative evidence of several signs. It is only, therefore, by marshalling all the diagnostic facts in the case that the greatest certainty can be reached, and this is possible only by precise and orderly method.

* Professor of Obstetrics in the Long Island College Hospital.

in the majority of cases before the end of the fourth calender month by the *choc fœtal*, active fœtal movements, and the mapping out of fœtal parts by the bimanual examination.

A declaration of pregnancy is frequently possible as early as the end of the third month.

The diagnosis of pregnancy is almost absolutely certain between the eighth and the tenth week.

In a large proportion of cases the evidence is conclusive before the end of the sixth week.

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*THE PATHOLOGY OF CARCINOMA.**

By Henrage Gibbes, M.D.†

THE subject of carcinoma is one of intense interest to the medical profession, both from the deadly havoc it makes in our patients and from our inability to cope with it when occurring in any site unfavorable for surgical interference. We are at the present time entering what may be termed a new era in the treatment of disease, and it is with the hope that in the near future we may be able to devise some method of treatment by which this dread disease may be arrested in its earlier stages, that I bring before you a subject with which you are all so familiar.

To study this disease thoroughly it is necessary to take it in detail, and to do this I will first classify it according to its morbid anatomy, then take its effects locally and secondarily, and finally the functional change produced in the parts and the etiology of the new growth.

Carcinomata may be divided into three classes, if judged by the epithelium from which they are developed, and by the structure of the new growths produced, and the epithelium from which carcinomatous neoplasms are derived is, in every case, developed from either the epiblast or hypoblast. The new growths are, therefore, always epithelial in type, and there is a sharp distinction between them and those of mesoblastic origin or connective-tissue type. The minute structure of carcinomata separates them into three groups:

1. Squamous epithelioma.
2. Columnar epithelioma.
3. Glandular carcinoma.

In the squamous epithelioma we have new growths, which are derived from epithelium, the arrangement of which in those parts where new growths most frequently arise is that of stratification; there are many layers of squamous cells, and the function of these cells so arranged is mainly that of protection to the parts lying beneath.

In a squamous epithelioma we find that this stratified epithelium has grown into the cutis vera, at first in large masses, which grow irregularly, but gradually become thinner, until they are composed of only one or two cells in thickness.

We know that a chronic intermittent irritation, such as that of a tight- or ill-fitting boot, will cause an increased growth of the epidermis, but this is always outward. We never find that the newly-formed epithelium has penetrated the layer of cement substance that fastens the epidermis on to the corium and grown into the structures below it; there is, then, a vast difference between the hypertrophied epithelium of a corn and an epitheliomatous growth.

But we also know that the dermal appendages, such as hair-follicles, sweat-glands, and parts of the teeth, are developed by a down-growth of epithelium. We have, then, in the formation of an epithelioma of the squamous type, a return to the fœtal condition, in so far that the influence, whatever it may be, which produces the new growth causes the normal epithelium to increase and grow downward in a similar manner to that which took place in fœtal growth, differing, however, in that the growth is now an abnormal one, endless, erratic, and without a definite object.

The function of normal stratified squamous epithelium is protective and not secretive, and its chemical reaction differs from that of secretive epithelium. This is easily shown by making vertical sections through the base of the tongue of a dog. Some of these will show one of the ducts of the mucous glands, which are numerous in this situation, cut longitudinally.

If one of these sections is now carefully stained with two colors which will not combine, such as rosanilin hydrochloride and iodine green, the protective or squamous epithelium of the tongue will be found passing into the mouth of the duct for a short distance, and will be sharply differentiated by the green stain from the secreting epithelium, which has taken the red color.

Another point in the normal condition of stratified squamous epithelium is the tendency it has under certain conditions to undergo a

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* Read before the Pathological Society of Philadelphia.

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horny change, by the transformation of its superficial cells into keratin. This is seen normally in the formation of the nails and the horny papillæ in the tongue of the cat.

We have, therefore, in an epithelioma a down-growth of squamous epithelium in a somewhat similar manner to the down-growth which takes place in fœtal development, and this epithelium has no secretive function, but has a tendency to undergo horny change.

In studying these growths, we find that they may be divided into those that have a large corneous formation and those that have little, and we find, further, that those with a good deal of horny change have been of slower growth than the others.

The new growth consists of stratified squamous epithelium. This is continuous with the normal epidermis when it has been derived from that source, and the cells forming the ingrowth are found to be stained more deeply on the outside of the mass than those in the centre, the outer cells being directly continuous with those of the rete Malpighi, and having the same reaction. In some parts we find the so-called nests or pearls. These are formed by the outgrowth of a secondary trabecula from the primary, which, in a vertical section of the growth, is cut transversely, giving the concentric arrangement. The outer cells of the nest are the active ones. They stain deeply, and correspond to those of the rete Malpighi in the normal epidermis. In some epitheliomata the proportion of corneous cells is very large, and they appear as yellow masses in a logwood-stained section.

The next variety is the columnar epithelioma. This starts from parts that normally consist of a single layer of columnar cells on a basement membrane, and the majority of these have a secretive function of a simple kind,—that is, the formation of mucus. The pyloric glands of the stomach, Brunner's glands, and similar glands which exist in the neighborhood of the ilio-cæcal valve, are compound tubular glands lined with columnar cells, which appear to have a higher secretive function than those lining simple Lieberkühn follicles. They all, however, have long ducts lined by columnar epithelium, and it is not certain whether columnar epitheliomata arise from the duct or the glandular epithelium when occurring in these parts.

New growths from these cells require a separate class from their structure and development. They are developed normally from an ingrowth of the hypoblast, and with two exceptions are situated in the mucous membrane, Brunner's glands and those near the ilio-cæcal valve being in the submucous coat below the muscularis mucosæ.

A columnar epithelioma consists of a new growth of columnar epithelium originating from that in the Lieberkühn glands or ducts of compound tubular glands, and in the new formation simulates the arrangement of normal columnar epithelium,—that is to say, the new growth is composed of tubes lined by columnar cells, but this tubular arrangement is very irregular. The epithelium is always on a basement membrane, and there is always a lumen to the tube, however irregularly it may be formed.

The new growth is always outward from the lumen of the part in which it starts. As in development the glands are formed by a dipping downward of the epithelium, so in the formation of these new growths there is an exaggeration of the fœtal condition.

There is, therefore, sufficient difference in these forms to make a distinct class.

The next variety is the glandular carcinoma. It is derived from epithelium in which the secretive function is at its highest development. These cells take from the blood, which is brought by capillary vessels into close proximity to them for that purpose, what materials they require, and by virtue of their protoplasm elaborate a substance which is the secretion of the gland of which they are the functional elements. They are situated on a basement membrane in single rows, and they pour their secretion into the lumen of the gland, the acini of which they line.

This description does not apply to the liver, but is it certain that primary carcinoma is ever developed, in that organ, except from the bile-ducts?

The minute structure of all glandular carcinomata is the same, and differs from the two forms already described in having a fibrous stroma forming a net-work, the interstices of which are filled with masses of cells, continuous throughout.

These glandular carcinomata are formed by germination of pre-existing gland-cells, the increase being towards the lumen and not outward, as in the other forms.

There are two kinds of glandular carcinomata,—one soft, the other hard. Their structure is the same, but one is of rapid growth, and contains a large amount of cells and little stroma, while the other is of slow growth, and contains a large amount of fibrous stroma with comparatively few cells.

For the purpose of investigating the struct-

ure of these growths, the mammary gland is the most suitable part, from the frequency with which the disease occurs there, and

Cancer of mammary gland. Germinating epithelium growing inward and filling up the acini; × 120.

from the ease with which the parts can be obtained in a perfectly-fresh condition, after operation.

When microscopic examination of a number of these cases is made, it is at once apparent that a great difference exists between them, no two being exactly alike.

The type on which they are formed is, however, always the same: as new cells are developed by the germination of the normal cells, under an abnormal stimulus, the same influence is extended to the connective tissue forming the frame-work of the gland, and this throws off fine processes which grow between the newly-formed cells and form the fibrous net-work. These fine trabeculæ consist, in the first place, of a capillary blood-vessel, with a small amount of fibrous tissue surrounding it, so that from the first the newly-formed cancer-cells are separated from the blood-vessels by a varying amount of fibrous connective tissue; that is to say, the naked capillary vessel is never in absolute contact with the neoplastic cells, as is the case in a sarcoma or mesoblastic neoplasm. This is an important point, as it affords a criterion for the differential diagnosis between sarcoma and carcinoma, and also explains the difference existing in the formation of secondary growths in these two neoplasms.

Encephaloid cancer is a rare form in the mammary gland, and, in fact, everywhere. Formerly it was considered to be common, but extended and more scientific observation has shown that most of the so-called encephaloids were really large, round-celled sarcomata.

We have, therefore, judging by the morbid anatomy, three forms of carcinomata, which are entirely distinct from one another.

One formed of squamous epithelium, which is avascular, and is nourished by the lymph in the same manner as the normal epithelium from which it springs.

Another composed of columnar cells, arranged on a basement membrane, mimicking the normal arrangement of the cells from which it is derived.

And the third, composed of masses of cells, with a net-work of fibrous tissue running through them and carrying blood-vessels for their nourishment.

The first two follow the type of fœtal development in their growth, the last does not.

I will now consider the method of growth locally, and the manner in which secondary growths are produced. As I have already said, epithelioma is simply a downward growth of stratified squamous epithelium. But when we examine a large number of these new growths, we find that among many minor differences there is one which is so marked as to constitute an essential characteristic in the morbid histology, — that is, the amount of horny change.

A number of these growths will be found in which the corneous change is very marked, which is shown by the round or oval masses, looking yellow in a logwood-stained section; the cells composing them appear to be dried up and to have lost their vitality. Around these masses, but generally separated from them by a small space, are a number of cells of epithelial type, which react to logwood in a normal manner.

Other growths show this horny change only in a slight degree; they contain no horny masses, and only a few of the central cells in a trabecula show evidences of keratoid change. Clinically, these two forms can generally be differentiated by the length of time they have taken to grow.

Their mode of growth, when once started, is, however, the same in every case.

If we take a few examples of those epitheliomata in which the corneous change is

well marked, we shall find some interesting facts.

We will take three cases, which differ widely. First, a typical soot cancer, or epithelioma of the scrotum, occurring in a chimney-sweep, which was of slow growth. These cases are now rare, as the demand for soot as a fertilizer is much less than it was formerly, and chimneys are swept by machinery. We must consider that the irritation caused by the soot was in these cases the starting-point of the new growth. We find, on examining a case of slow growth, that throughout it are large yellow masses of altered epithelial cells, while round these, but sharply defined from them by their reaction to the logwood stain, are a number of cells of epithelial type, and from these are processes, formed of similar cells, running in every direction, but gradually becoming smaller, until they consist of only one or two cells.

Next we will take a growth showing that it originates, in the first place, from an injury.

In this case, twenty years before the case came under observation, a slight injury to the back of the hand resulted in a dry, horny growth. After a time this was removed, and was succeeded by a number of smaller horny growths, the whole only covering a space of about three-quarters of an inch in diameter. This remained for a number of years, until muriatic acid was freely applied, with the result that the growth rapidly increased until nearly the whole of the back of the hand was involved, necessitating its removal by amputation. This growth showed on microscopical examination the same appearances as those described in the case of soot cancer.

Another case differed from these two in that there was no history of any exciting cause.

A woman, aged 60, stated that a growth of a hard, warty nature had existed in the inguinal region ever since she was a young girl. She was positive that there had been no treatment of any kind. Shortly before she came under observation she noticed that the inguinal growth had become much larger, and was increasing rapidly. At the same time she found that a tumor was forming in the labia, and was also rapidly growing. Both of these were removed. The first showed the horny formation already described; the second consisted entirely of squamous epithelium, growing in the irregular manner usually found in an epithelioma which is rapidly increasing. There were no horny masses in it, but here and there a few cells could be found which had undergone a horny change in a slight degree. Whether this pudendal growth was secondary to that in the groin is not clear, but from several small blood-vessels ending abruptly in masses of epithelial cells, it would seem that the infection had been carried by the circulation.

In studying these varied cases, it becomes evident that an increased growth of epithelium, which undergoes a horny change, may take place and exist for years without being in any way an epithelioma, and this is proved by other cases which I have examined when a long-standing growth was removed, which, on microscopical examination, proved to be entirely composed of horny epithelium, with no trace of cancerous formation. On the other hand, these corneous epithelial formations seem to have the power of setting up cancerous growth when a direct stimulus is applied, as in the case of muriatic acid; or, when they have existed for many years, the same change may take place from causes of which we are unable to find any evidence.

An interesting point in the formation of these cancerous conditions from horny epithelial growths is that, although the cells of which they are formed seem to be effete and to have lost their vitality, they must in reality possess powers of germination, as they exist in the cutis vera far from any epithelial cells, and the new growth is seen to be derived directly from them.

Epitheliomata which arise on the hands or arms of tar- or paraffine-workers, or in the tongue from the irritation of hot tobacco-smoke, do not, as a rule, show these horny masses, but the central cells show evidences of having undergone more or less keratoid change. When, however, an epithelioma has arisen from the oral mucous membrane, the cells of which it is composed are large, and resemble those found normally in that position, and they retain these characteristics throughout the growth.

Whatever differences may exist in the formation of the primary growths, the production of secondary growths is always brought about in the same manner, commonly by the lymphatics, rarely by the blood-vessels. As these growths send processes into the depths of the tissue, these gradually become smaller, and, naturally following the line of least resistance, work their way into the lymphatic spaces, when they finally become reduced to a line of single cells. One of these easily becomes detached, and is carried away by the lymph-stream. These down-

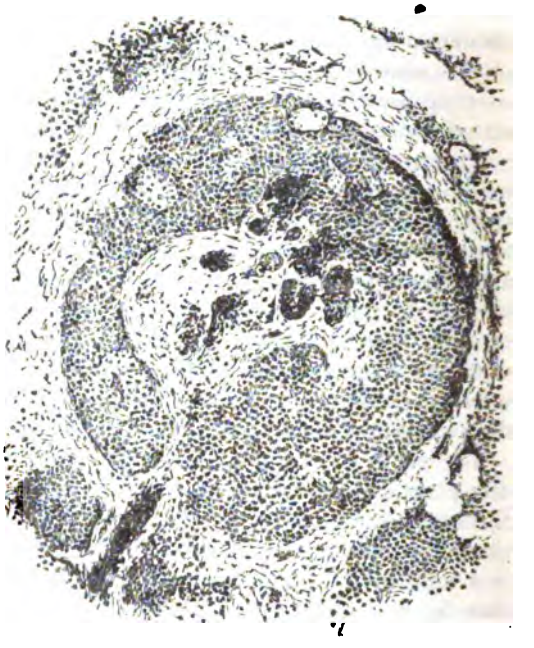
growths, however, grow slowly, and secondary infection is long in taking place.

The Columnar Epitheliomata.—The growth is an outward one from the lumen, and there is no proper stroma formed, the new growth pushing its way among the existing tissue, but always retaining the same formation,—columnar cells on a basement membrane. When a growth of this kind occurs at the pylorus, the whole mass of non-striped muscle forming the sphincter becomes permeated by it. In the liver these growths start from the epithelium of the bile-ducts. In some cases irregular growths of this kind are found, which closely resemble the dilatation of the bile-ducts produced by psorospermiæ in the liver of rabbits. It is possible that some of the cases which are considered to be columnar epitheliomata may be produced in a similar manner.

Columnar epithelioma of the liver. May possibly be of parasitic origin; × 130.

The method by which secondary growths are produced from these columnar epitheliomata is not clear, and so far I have been unable to get any satisfactory evidence of the route taken by the infecting material.

The Glandular Carcinomata.—The action of the stimulus which causes germination of the secreting epithelium also causes a growth of fibrous tissue, and in this way the net-work is formed with the cells in the interstices, and the blood-vessels in the fibrous trabecula, the normal condition of the gland being entirely altered. This is the usual course in a scirrhus carcinoma. There are, however, rare forms occurring in the mammary gland when each acinus becomes filled with newly-formed cells, derived by germination from the normal cells, but without any fibrous stroma running between them. This is, however, I think, only an early condition, as in some cases this arrangement can be found in one part, while another near by may contain a typical scirrhus. One thing, however, that is worthy of notice is, that the epithelium of the ducts remains intact among the cancer cells, and shows that its reaction is different by the way it takes the logwood



Cancer commencing in an acinus of the mammary gland; × 130. The ducts remain in the centre unchanged, and have a different chemical reaction to the cancer cells.

stain. The method by which these glandular alveolar carcinomata are reproduced as secondary growths, in the nearest lymphatic glands, is a very interesting one. As is well known, secondary growths in the nearest lymphatic glands occur early in the course of the disease, and this is a natural consequence from the formation of the growth itself. The cells are in masses, in direct contact with the stroma, and the blood-vessels are situated in the stroma, and separated by it from the cells. Therefore it is a difficult matter for a cancer cell to get into a blood-vessel. Consequently dissemination by the blood-stream is not the manner in which secondary growths are produced. If they were, they would occur late in the course of the disease, as is shown in sarcomata, where, although the blood-vessels are in direct contact with the cells of the new growth, dissemination throughout the body does not occur in the earlier stage, but when it does is very general.

Secondary growths in glandular carcinomata are produced by the passage of cancer

cells from the primary neoplasm, through the lymphatic channels in its stroma, to the lymph-vessels of the affected gland, and through them to the nearest compound lymphatic glands.

I base this statement on a careful examination of five cases, where the mammary gland was removed in the earliest stage of the disease,—that is, within a few days of its first discovery by the patient,—and where the whole mammary gland, together with the pectoral and axillary glands, were removed without their connection being separated.

The method adopted in each case was this: All the parts removed were placed at once after operation in Müller's fluid, and brought to my laboratory. They were then carefully dissected out, and each part placed in a separate bottle and labelled. After they were properly hardened, sections were made of each part and examined separately. The results were carefully noted in each case, and then the five cases were compared.

The facts established were these: In the first place, the stroma formed in a glandular carcinoma is composed of fibrous connective tissue, and the elements of this are arranged in a similar manner to that of normal tissue,—that is, in a more or less felted manner,—whereby spaces are left between the fibrils, which are filled with lymph, and are parts of the lymph-canal system of the body. Now, these lymph-spaces are directly in contact with the masses of cancer cells. Consequently it is an easy matter for one or two cells to separate themselves from the parent mass and enter a lymph-space, as they probably possess more or less amœboid movement. And that they do this is very plain, as numbers of these lymph-spaces can be seen containing one or two cancer cells. The current in the lymphatic system is always from the periphery towards the centre, and there exists, therefore, a *vis à fronte* sufficient to draw these cells onward directly they have entered the lymph-channels. As soon as these channels are passed and a formed lymphatic vessel entered, the valves, always existing there, prevent the possibility of any return, and also insure an onward progress.

The lymph-vessels themselves are so small and of such delicate structure that I have been unable so far to demonstrate the presence of cancer cells in their course; but, taking their termination in the capsule of the compound lymphatic gland, it is an easy matter to show them filling the lumen of the vessel, and passing along the lymph-paths of the gland itself. Their chemical reaction is so different from normal lymph-cells that my logwood stain picks them out at once. I think from these

Section through the periphery of an axillary lymphatic gland. The mouth of the afferent lymphatic vessel is distended by a mass of cancer cells brought by it from the primary neoplasm; × 220.

observations, which have been carefully carried out, I am justified in saying that the primary cells of a glandular carcinoma occurring in the mammary gland do pass through the lymphatics to the nearest compound lymphatics, where we know secondary growths are most commonly found.

I also consider that this takes place in a very early stage of the disease, as in these five cases, taken as early as possible after the morbid process had declared itself, there was not one in which the highest axillary gland—that is, the one situated farthest from the primary growth—was not affected with the disease. This seems to be a most significant fact, and early operation would appear to be imperative. The after-history of these cases shows that sometimes the disease is entirely eradicated, while in others it is not. I think the explanation of this must be that in these cases the cancer cells take a somewhat different course to that generally followed, through the pectoral and axillary glands, and either pass through the sternal glands, along the line of the internal mammary blood-vessels, or they must pass entirely through the chain of axillary glands to the subclavian vein or thoracic duct.

It is, however, certain, that in the majority of cases the disease is confined in its earliest stages to the primary growth in

gland itself, and the secondary in the pectoral and axillary glands. There is, however, no reason why a cancer cell cannot travel the whole range of these glands and get into the blood, provided the change produced by the secondary growth has not involved and altered the whole of the normal structure of the gland. When this is done, the whole gland is changed into cancerous tissue, all afferent and efferent vessels are obliterated, and the growth itself is confined by the dilated capsule of the original normal gland.

The next point to consider is the change that takes place in one of these compound lymphatic glands when invaded by cancer cells. It is necessary to remember the normal structure of the glands in question. They have a fibrous capsule, into which the afferent vessels open, and through channels in it pass the lymph into the sinuses in the gland itself. These are occupied by a coarse adenoid tissue, and the follicular masses containing the lymph-capsules are separated from them by a fenestrated membrane. We have, then, an organ the constituents of which are all, so far as we know, of mesoblastic origin, and which is permeated by sinuses arranged to carry the lymph brought by the afferent vessels through these sinuses, enrich it in its passage with numbers of ripe lymph-capsules, and discharge it at the hilus into the efferent vessel. There is one point in connection with the histology of these glands on which embryologists have not yet enlightened us. I mean as to the origin of the large flat epithelioid cells which lie on the nodes of the adenoid reticulum. These cells are epithelioid in character, and if their origin should be found to be epithelial, it would help to clear up some obscure points in morbid histology. When the cancer cells carried from the primary growth enter the sinuses of the lymphatic gland, they pass along for some distance, but soon get fixed in the meshes of the coarse adenoid tissue. As soon as they become stationary they begin to develop a secondary formation, the protoplasm increases, and the nucleus divides, until a large multinucleated mass of protoplasm is formed. Differential staining at this stage shows some peculiarities in the chemical reactions of these cells and in their structure. Using red and green aniline colors, which will not combine, these large multinucleated masses of protoplasm take the red stain deeply, and examination with high powers shows no structure in the majority of the nuclei. One or two, however, in the mass will be found that have taken the green color. They are situated at the edge of the mass, and their nuclei show

Cancer cells having passed into a lymph sinus in an axillary gland have germinated and distended the sinus; × 130.

well-marked convolutions; the protoplasm also surrounding them is seen to be sepa-

Secondary cancer in an axillary gland; × 660. The dark mass has been formed by the germination of a cancer cell; the high cells at the edge have separated from this mass.

rating from the mass. On examining the structures lying between these multinucleated

masses, a number of large single cells are found, containing large nuclei, with well-marked net-works in them, and they have all taken the green color. Further careful examination will also show some of these cells, in which the reaction is changing again to the red and the nucleus is becoming opaque. The explanation of this seems to me to be that a cancer cell deposited in a lymphatic gland is in the active stage, the protoplasm increases, the nucleus divides, and finally there separate from the mass individual cells, which then pass into the resting stage for a time, and their reaction to staining agents shows that their chemical composition varies in these different stages. I have found precisely similar changes in secondary growths in the liver and other parts. These peculiarities in the germination and in the chemical reactions at different stages are of interest, and tend to show that these abnormal cells still retain normal qualities.

There is an interesting point in connection with secondary growths from squamous epitheliomata occurring in the portio vaginalis. Some authorities consider that a carcinoma in this situation does not produce secondary growths in the uterus, but in the vagina. I have recently examined two cases which disprove this. Curettings were made on account of persistent hemorrhage, and on examining them I found a hypertrophic condition of the mucous membrane. In each case the curettings were from the fundus. Judging only from the appearances presented by the mucous membrane, these were cases of so-called adenoma of the uterine glands, but on careful examination of the deepest parts removed, I found squamous epitheliomatous cells in the blood sinuses. These cells had been carried backward towards the fundus, had then grown towards the surface, and the irritation set up by their growth had caused hypertrophy of the mucous membrane,—the so-called adenoma. Death occurred in each case some months afterwards, and this condition was verified. It seems to me that some of the villous growths in the bladder may be explained in the same way, although in a large number examined by me that were removed during life by Sir Henry Thompson, I was unable to find any evidences of carcinoma, but, considering the great length of villous growths in this situation, the cancerous tissue may not have been reached.

The next consideration is the causation of these cancerous growths.

I have already shown that in the secondary formations arising from these, the epithelium of which they are formed is always of the same kind as that existing in the part where the primary growth first begins. That is, a neoplasm starting from squamous epithelium is formed entirely of squamous epithelium. Another, starting from glandular epithelium, is always formed of epithelium resembling that found in secreting glands. A squamous epithelioma does not in any case contain columnar or glandular cells. We know that the normal cells are formed from cells in either the epiblast or hypoblast, and we cannot distinguish between these cells in their embryonic condition, but as they develop and form the different adult conditions, some become squamous with a protective function, others glandular with a secretive function. Judging from the results produced by abnormal action on these adult cells, producing a neoplastic growth from them, we may consider that in their adult normal condition they have reached the highest point in development for which they were destined, as we never find, when an abnormal stimulus is applied to them, causing them to take on abnormal growth, that they pass into a higher stage, no squamous cells ever becoming glandular. This is an important consideration, as it shows that, whatever the cause may be which brings about the cancerous change in epithelial cells, its action is merely to cause increased growth in them. That it may, however, have an important effect on glandular epithelium as regards its function is highly probable; for, unless we consider that the cancerous influence has affected the secretive function of glandular cells in such a manner that they produce in their abnormal condition something deleterious to the person affected, we cannot explain the marked cachexia produced in many cases.

In studying the etiology we have, therefore, a condition where some unknown influence acts on certain cells and causes them to grow, slowly in some cases, rapidly in others, and in those cells having a secretive function this is probably altered.

There is, however, a further consideration. Each cell formed under this abnormal influence is endowed with the property of increasing by division, wherever it may be carried, at the expense of the tissues in the part where its course is arrested; and more than this, it carries with it the power of producing changes in the cells formed by its germination, which may be either normal or abnormal. This is shown in the keratoid cha

set up in single cells in the secondary growths in squamous epithelioma, and in the colloid change of the cells in columnar epitheliomata, where the primary growth was subject to that degeneration.

Various theories have been advanced to account for the growth of neoplasms. Among these, Cohnheim's embryonic remains was at one time thought to explain matters, but further investigation showed that it was based, in the first instance, on an abnormal condition, and was untenable.

The doctrine of altered physiological resistance also met with some favor, but a thorough knowledge of the histological conditions and the primary changes set up in them by cancerous growth deprives this theory of any basis.

The latest view is that advanced by Dr. Russel, of Edinburgh, who describes a characteristic organism of cancer. He here makes two assumptions, which he does not prove,—first, that it is an organism ; second, that it is characteristic of cancer. Both these assumptions have already been abundantly disproved. The so-called organism exists in large numbers in every case of syphilitic warty growth that I have examined, and it consists of what look like broken-down nuclei which have no resemblance to any organism, vegetable or animal.

There are some workers who are now investigating this disease with the confident hope of proving its bacterial origin. Now, I would ask, does it seem probable that any organism could have the power of exciting new growth in cells of such varying character, yet which in each case retains its individuality, and further transmits to all the new cells formed in its growth certain peculiarities, and in some cases morbid changes, as in the colloid degeneration of columnar epithelioma?

Are we to understand that the action of an organism on the original cells from which the growth first springs can be of so potent a character that it can impart to these cells peculiarities which they are then able to transmit to all the numbers of cells formed afterwards from their germination? This does not seem possible, and, if it were the case, we must imagine a different organism acting in each of the varieties of carcinomata.

Numerous experiments have been made for the purpose of testing the possibility of communicating the disease from the human subject to healthy animals, and they have all proved futile ; but there are experiments on record which would seem to prove that it is possible to transplant a portion of cancerous material from one part of an affected patient to another part of the same patient without destroying its power of growth.

Does not this show that these cells have in themselves no inherent power of increase, but that there must be a peculiar condition of their environment by which they are enabled to live and grow? In epithelioma of the skin, it is easy to find cases where the newly-formed epithelium has grown in the cutis vera a long distance from its starting-point. In many instances it can be shown to have grown almost into contact with the normal epidermis over it, but this is not in any way affected by the proximity of the new growth. So that the influence, whatever it is, acted at one point only, and affected the cells there, giving them the power of infecting their descendants, but not other normal cells.

This would seem to prove that only certain cells of any particular kind are liable to be influenced by the conditions which cause cancerous growth. This view is further corroborated by the fact that in the mammary gland a large portion may be entirely changed by fibrous degeneration, while some portions involved in this degenerative process may be changed into cancer tissue ; yet other parts do not show this change.

Some authorities have advanced a theory that cancer cells can exert what they call spermatic influence on normal cells of any kind, transforming them into cancer cells. If this were the case, the secondary growths in their earliest stages, in such organs as the liver or lymphatic glands, would show the process going on. I have made an extensive investigation into this, and feel confident that the only effect the growth of alien cells has on those of the invaded organ is one of destruction. The normal cells can be seen in every stage of disintegration before the invading growth.

That carcinoma is the local manifestation of a constitutional disease seems to me highly improbable from the manner in which it invariably makes its first appearance in a single organ. The cases recorded of multiple primary carcinoma are very vague in detail, and we must remember that we have no knowledge of how soon cells from the primary growth pass on and establish secondary infection. From cases I have observed it must occur sometimes at a very early stage. From the large percentage of cases in which heredity

has been proved, it seems to me that we must admit an inherited cancerous tendency in certain cells of the body in some individuals, which may be brought into activity by injury or prolonged irritation, or in other cases is excited into action when an organ passes into a condition of senile inactivity. What this inherited tendency is or from what it is derived is impossible to determine, but when we consider the direct transmission of syphilis from parent to child, and the knowledge that we possess of epidemics of this disease existing all over the known world in former ages, it is quite within the limits of possibility that a taint should have been transmitted, which, in its attenuated condition at the present day, might manifest itself in abnormal growth, which after all is what carcinoma really is. Leaving this point for elucidation to those minds having a propensity for abstruse questions, we have to face the fact that to arrest this disease we cannot hope to act on its hereditary nature, but on its local development. We have, therefore, before us the problem that in the three forms of carcinomata are developed three different kinds of neoplasm, and that to arrest them the treatment cannot probably be the same in each case, but the principle, it seems to me, on which we must act is the same. We must find some substance that when introduced into the system will arrest this abnormal cell-growth, either by interfering with the local cause setting it up, or by so acting on these cells as to prevent their further increase.

There is one point in connection with nerve-trunks and nerve-endings which exist in proximity to squamous epitheliomatous growths, but which are not involved in them, that I have never seen noticed,—that is, the change produced in them by a fibrous growth. This is shown by the increased thickness of the perineurium, by a fibrous change in the endoneurium which has destroyed a number of the nerve-fibres, and by a well-marked change in the capsules of Pacinian corpuscles. They have become very much thickened and contracted, giving a peculiar corrugated appearance to these nerve-endings. These changes occur in nerve-structures at some little distance from the neoplasm, but whether this change is brought about by the growth or has any connection with its formation I am unable to say. It is, however, so far as I know, peculiar to squamous epithelioma, as I have often found nerve-trunks passing through glandular carcinoma with their individual nerve-fibres unaltered, and in cancer of the mammary gland I have found perfectly normal Pacinian corpuscles. It may be that an

Nerve-trunks in the vicinity of an epithelioma of the skin; they have undergone a fibrous change; × 130.

epithelioma has the power to affect a nerve-trunk not directly involved in its growth, or it may be that a primary change in the nerve-trunk may affect the part it controls. This is an interesting problem, which may have some bearing on these neoplasms.

Whatever may be the causation, it seems to me that we have to arrest growth in cells, which by their histological appearance and chemical reaction are acting precisely in the same manner as normal cells undergoing germination, but under the influence of an abnormal stimulus.

And I have thought that any substance which would arrest development of normal tissues when introduced into the system ought to act in a similar manner on these cells developing in an abnormal condition. I have been experimenting in this direction for some time, and have obtained results which give me some hope of ultimate success.

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*GASTRECTASIS.**

By L. Wolff, M.D.,† Philadelphia, Pa.

DILATATION of the stomach is known as that condition of the stomach when it is abnormally enlarged and its muscu-

* Read at the meeting of the J. Aitken Meigs Medical Society, September 11, 1890.

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lar fibres impaired to an extent that the gastric contents are only slowly or insufficiently propelled through the pyloric orifice. Not all large stomachs are dilated; in fact, there is quite a difference in the capacity of normal stomachs, so that, while some have been stated to have held only two hundred and fifty cubic centimetres, others are said even to hold as much as sixteen hundred cubic centimetres. One can really speak of an abnormally enlarged stomach only when it holds more than the latter amount. Even large and enlarged stomachs may not give rise to pathological digestion, but the dilated stomach, which may be an outcome of the former, always indicates a pathological structural change, and invariably gives rise to a disturbed peptic act.

There are two factors which may be considered as etiological of gastrectasis. Pyloric stenosis is one, and muscular atony of the stomach constitutes the other. In the former, the condition of the obstructed pylorus may be compensated by a muscular development equivalent in propelling power to the obstruction, similar to the compensation in valvular obstructions of the heart. This natural tendency to equalization of impaired function can exist for a limited period only, and must soon give rise to muscular atrophy and genuine dilatation. The causes of stenosis of the pylorus are manifold, and may depend upon mechanical obstruction by external influence, as from floating kidney, pressure, and displacement of the duodenum; or it may result from pathological changes within the stomach, and its pyloric part in consequence of ulceration, inflammation, cicatrization, and neoplasm of either benign or malignant character. Thus polypi may be the cause, as well as an abnormal development of the mucous membrane of the pyloric part of the stomach, and catarrhal hypertrophy may result in the same condition. The dilated stomach may give rise to displacement itself, and with it a partially or totally obstructed duodenum, which cannot be overcome by the already impaired muscular force of the viscus. An increased and abnormal acidity of the gastric juice may besides these give rise to spastic contraction of the pylorus, and though this may not be permanent, it may be followed by true gastrectasis. In the same manner are ulcers, abscesses, and even foreign bodies capable of producing spastic constriction of the pylorus with consequent dilatation.

The gastric ectasis resulting from muscular atony of the stomach, the atonic dilatation of the stomach, may result by muscular exhaustion from over-exertion, or the insufficient nourishment of the muscle consequent on anæmia, chlorosis, and nervous affections. Under this class may be also counted the chronic gastric catarrh and the loss of chemical digestive secretion which is known to form a stimulus for gastric peristalsis. The nervous elements contributing to muscular atony of the stomach are not sufficiently explained, though there seems no doubt a direct relation between a lack of intestinal peristalsis with gastric ectasis. As another cause of gastric dilatation may be mentioned the destruction of the muscular tissue of the stomach by ulcerative processes of some extent, though they may not themselves materially give rise to a loss of tissue, but rather cause cicatrization, with distention of other parts of the stomach.

The anatomical lesions of the muscular coat of the stomach in gastrectasis may present to microscopical inspection a hypertrophic appearance, according to location. Hypertrophy, or what might be called such, from the fact that the muscular tissue is infiltrated with inflammatory products, cancerous material, etc., may be readily defined with the microscope. The same may be said of cicatricial tissue, which may cause hypertrophy in the pyloric portion. Hypertrophy may and frequently does, in persons of advanced age, result in atrophy. Atrophy, however, is more usually found in the cardiac portion, and may be caused by colloid, but more frequently by fatty, degeneration, which increases, together with connective tissue, the interstices between the muscular fibres. The appearance of the mucous coat presents a picture of inflammatory changes, and it may be smoothly disposed or at times even mammillated; there is no marked change in some of the glandular ostia, though the volume of the tubes appear enlarged, and the ovoid cells may be seen in a condition of partial destruction and turbidity, while in some of them they appear to be partly or totally wanting.

Gastric dilatation is more apt to be met with in middle-aged people than in the young, though it has been reported in the young and even in children. The development of this condition is always more or less gradual, and on account of the prevailing symptoms it is in the beginning generally considered as simple dyspepsia, attributable to errors in diet or nervous causes. To the general symptoms of anorexia, epigastric pressure and fulness, ab-

dominal distention, buccal fetor, supraorbital headaches, and irregularity of the bowels, there is to be added, as a characteristic feature of extreme dilatation, the vomiting, which occurs at intervals, when by superadded ingesta and the fermentative changes they are undergoing the distended stomach becomes irritated and reflex vomiting takes place. This may occur in periods of several days only, or may be even more protracted where total paralysis of muscular structure has ensued. There is one unmistakable feature of the vomiting of gastrectasis, and that is the enormous quantities which are ejected at one time, the comparative ease with which the emetic act takes place, and the character of the ejecta, which are composed of the food particles of several of the meals previously ingested, together with the fermented appearance it presents and the gases arising therefrom on standing. The microscopic examination of the vomited matters reveals the presence of yeast fungi and other cocci and bacteria of decomposition, together with sarcinæ ventriculi, which at one time were considered so important, but have now no prognostic or diagnostic value.

The chemistry of the functional dilatation is, in cases where marked chronic catarrhal symptoms are absent, a normal one, or rather perhaps one of subacidity; in complete dilatation from pyloric stenosis, it is held by such eminent workers as Ewald and Riegel that in all cases non-cancerous they had found HCl, though in a diminished amount. I have not been able to confirm their statements, as in the case which I will present to you to-night the gastrectasis which resulted from complete pyloric stenosis was during the whole time of treatment accompanied with anacidity, and the patient, though apparently cured of his stenosis and improved in dilatation, presents yet the picture of total anacidity. The second case which I will present to you to-night of a functional dilatation, with chronic gastric catarrh, has shown from the beginning of treatment total anacidity, and acidity is returning gradually as result of treatment. The gastric distention in a dilated stomach is still further increased by the changes of decomposition, which give rise to gases of various kinds, such as CO_2, H, CH_4, H_2S, etc., which are only slowly regurgitated through the œsophagus; the patients, besides, are troubled with pyrosis, from the presence of acetic, butyric, and lactic acids. This formation of organic acids and their by-products of gases are due to the lack of HCl in the dilated stomach. It is claimed that the irritant effects upon the gastric mucosa gives rise to another great symptom of gastrectasis, which is impaired absorption. The tests, hereinafter to be mentioned, with salol and KI, confirm this in an apparently clear manner, which, however, depends as much on a loss of muscular propulsion as on the chemical irritation. The patients suffering from high-graded dilatation soon manifest marked inanition, and while in such cases the vomiting becomes less frequent, the fetor of the eructations becomes more marked. The near-lying viscera are displaced, fæcal discharges are more retarded, and dyspnœa and cardiac palpitation increase in a measure that the diaphragm is pressed upward by the distended stomach. Intestinal absorption is also diminished, causing dryness of skin and flabbiness of muscles, owing to the want of water of these organs. Nervous phenomena go hand-in-hand with this from the same cause, resulting often in coma, convulsion, and cardiac impairment. All these symptoms have been ascribed to the presence of ptomaïnes, poisonous gases, and by Litton to aceton; but it it is not apparent that, with a claimed lack of absorptive power, such auto-intoxication could be probable, and, in fact, Frederick Mueller has examined the contents of stomachs under such conditions for ptomaïnes without results.

The diagnosis of gastric dilatation is not always easily effected in its early stages; the ordinary symptoms of dyspepsia are more evident than the deeper-lying etiological factor. Before the characteristic vomiting takes place, medical examination will not always be directed to the employment of physical diagnostic measures. When this is done, inspection may lead, in the case of thin and pliable abdominal parietes, to reveal a protruding hemisphere, if the stomach is distended with gases or liquids, extending from beneath the ribs from the left to the right hypochondriac region; its lower segment extends to the line of the umbilicus, or any portion below this towards the symphysis pubis. The curve may be altered in various ways, according to the position of the ingesta; gastric peristalsis may become sometimes apparent under such conditions. The inspection may become facilitated by the employment of inflation of the stomach, which is best effected by an ordinary atomizer-bulb through a stomach-tube, more so than with the much-vaunted method of inflation by means of mixtures which generate CO_2 in the stomach. Further inspection in advanced gastrectasis reveals the ab-

dominal parietes somewhat flabby and sunken over the empty viscus, the false ribs of the left side appear lifted up, and the skin is dry, pale, and of cachectic appearance.

Palpation of the epigastrium in the simple form of gastric dilatation will be of little aid in regard to the distended viscus, but may be said to be of the greatest value in the determination of the causes which lead to it. As I have already stated, complete gastrectasis is almost invariably, if not altogether, the consequence of pyloric disease and obstruction. This latter is capable of being discovered by palpation alone. Thus carcinomatous and other tumors can be detected on the right side of the epigastric region, and floating kidney, or even pyloric hypertrophy may so be ascertained.

The employment of percussion will be the first step to make the presence of dilatation more certain, if properly conducted; thus the lower contour of the stomach may be with accuracy determined. If a stomach before inflation contains some fluid, or if the patient has been directed before inflating to take a glass of water, and he is thereupon examined in an erect position, the dulness of the water-line will be readily detected by percussion from above, while the lower segment of the fluid can be readily ascertained by the dulness which distinguishes it from the resonance of the colon from below. It may be necessary, however, for this latter purpose to inflate the colon, if it is not already tympanitic. Tumescence of the pyloric region may also be indicated by dulness of that part of the organ.

Auscultation may be used to advantage in gastrectasis, if combined with a tube and inflation in a stomach containing fluids. I have relied upon this method largely for determining the lower segment and extent of the distention. To this end I employ an ordinary small stomach-tube, having previously ascertained that the stomach was empty, or, if not so, having washed it out, I direct the patient to take a glass of water. If, now, the stomach is inflated while the ear is applied to the epigastrium, the point of greatest intensity of the bubbling sound of the air escaping through the small quantity of water contained in the stomach will accurately determine the lowest part of the stomach. In patients with thin abdominal parietes this will besides become readily apparent to palpation. The swallowing sounds, or "Schluck Geräusche," so important at times in the study of cardiac constriction, are of little, if any, importance in the study of gastric dilatation.

The chemical diagnosis of gastrectasis may be twofold,—first, as to the propulsive power of the stomach. As already stated, the power of the stomach to rid itself of its contents through the pylorus depends largely, besides the lumen of the latter, on the action of its muscular coat. With atony and paresis of the latter this is retarded, and in complete pyloric stenosis entirely abolished. This has been ascertained with great ingenuity by the administration of salol, which is a compound ether of phenyl and salicylic acid radical, and in the alkaline intestinal contents readily splits up into phenol and salicylic acid, the latter of which promptly appears in the urine as salicyluric acid, easily recognized therein on the addition of neutral ferric chloride, which turns it to a rosy-red color. Experiments have proven that salol is not directly absorbed by the stomach, and that its decomposition is probably brought about by the pancreatic secretion. Under normal conditions, the presence of salicyluric acid in the urine may be demonstrated within forty to seventy-five minutes after the ingestion of salol. Any period longer than that may be attributed to a paretic condition of the muscular coat of the stomach.

The chemical examination of the gastric secretion will indicate the pathological condition of the digestive function arising from dilatation, rather than give an idea of an existing ectasis. It must be said, however, that the determination of a faulty digestive secretion is, perhaps, the first step that leads us to suspect structural changes. I may say that, while I have examined numerous instances of gastrectasis in which I found HCl present, the quantity in each one of these was below normal, while in the older and graver cases I have never discovered any HCl. The pathological changes in the mucous coat, showing a partial and often total destruction of the ovoid cells within the ostia of the peptic glands, and our knowledge of the origin of this acid from these cells, would point to the impossibility of HCl secretion in old and extensive cases of dilated stomach, contrary to the opinions and writings of some who claim that such is and can be the case.

I have dwelt in several previous papers* on the subject regarding the technique of the

* "Recent Advances in the Diagnosis and Treatment of some Diseases of the Stomach," by L. Wolff, M.D. (*Medical News*, September 21, 1889); "Chemistry of Gastric Digestion," by L. Wolff, M.D. (*Transactions of the Philadelphia County Medical Society*, October 9, 1889).

chemical examination of the gastric secretion, and will, therefore, omit it here. I will state, however, that in numerous examinations of the secretion of dilated stomachs, in all stages, I have never failed to find the presence of pepsin, as shown by its digestive power on coagulated albumen when acidulated with HCl.

As further physical means of determining the presence and extent of gastric dilatation, should be mentioned the complete filling of the stomach with water through a tube, and then siphoning out and measuring the water it contained. Any stomach found to hold more than two thousand cubic centimetres, or two litres, may be safely regarded, then, as dilated.

The prognosis of gastrectasis must vary with the causes of the dilatation; as a distended stomach itself is not a condition that would seriously impair health and life, the consequences rather than the structural change have to be taken into consideration. Dyspepsia and apepsia exercise, if not corrected, such pernicious influence on health that through malassimilation they may produce inanition, and thus prematurely end life. The degree of these is, however, conditioned by the structural changes that take place at the pyloric orifice. If these are malignant, the fatality of the disease is obvious, unless interfered with surgically. This is also the case with polypi of the pylorus and cicatricial stenosis; in this latter instance, however, the prognosis as to life is more favorable, not alone through the better results obtained with such cases by surgical procedure, but also by the removal of the hyperæmia, which may be obtained by relieving the gastric mucous membrane of the irritation by the pathological digestive act. Most favorable are the atonic cases of recent distention, owing to continued errors of diet and excessive eating and drinking. In these cases, which we may term for convenience paretic ectasis of the stomach, good results will probably always follow proper treatment. As much cannot be said of cases where the distention is complete and the muscular fibres are in a state of paralysis. Under such circumstances, which are characterized by continued absence of HCl from the stomach, much can be done to relieve the distress consequent thereupon, together with the dyspeptic symptoms, and a lack of the proper elaboration of chymus in the intestines, and the malassimilation depending upon it. Little is to be hoped for reducing the viscus to its normal dimensions or establishing in such stomachs a proper chemical digestive act. Such patients, however, may be kept for years in a comfortable condition by observing a proper regimen or avoiding errors in diet. It is true that, sooner or later, the dilatation may give rise to conditions which are not easily overcome by palliative treatment, and for which, then, the surgeon's knife might hold out the only hopes for improvement. Since we know, however, that persons with gastric ectasis, and an absence of proper HCl secretion, may be able to live comfortably, and, under proper precautions, may certainly gain weight, such interference, when malignancy can possibly be excluded, should not expose patients to the risks of an operation until other measures have been exhausted.

The treatment should be directed, first of all, to relieve the symptoms of indigestion, the vomiting resulting therefrom, and the establishing of a proper peptic function. To this end it is obvious that emptying of the contents of the stomach, and the removal therefrom of the accumulated mucus, together with the causative elements of fermentation, are of prime importance. While emesis, so characteristic of this affection, will probably meet the first contingency, that of rendering the stomach aseptic can be accomplished only by lavage. To this end the stomach-tube should be employed daily, or even twice in that period; the quantity of liquid to be employed depends on the condition supervening, but should not be suspended until the washings return perfectly clear. Where the catarrhal condition gives rise to the presence of viscid mucus, it is necessary to add to the water a drachm or two of sodium bicarbonate; where the rank odor of butyric and acetic acids indicate the presence of organized ferments, additions of similar quantities of either sodium salicylate or sodium borate should be made. The time best suited for washing out the stomach is before the principal meal of the day, and may proceed this best by a half-hour. One of the most important features of the treatment next to this must always be the dietary regimen. Food substances which are slowly digested should be carefully avoided, as well as those which are prone to fermentation. It has been held that a dry diet should be the principal feature of such dietetic treatment, but I differ in this respect. *A priori*, it appears to meet the indications; but when we consider that dry foods are not readily acted on by the peptic secretions, and that the stomach is certainly still capable of directly absorbing some liquids

and liquid foods, the precaution appears superfluous, and it has proven of no advantage in my experience. Milk diet, so freely and promiscuously ordered in all digestive troubles, is probably the most objectionable in this affection. Scraped meat on toast, white meats of fowl, stewed mutton, or boiled beef answer to excellent advantage when followed by 15 to 20 drops of HCl, diluted in a wineglass of water. Toast in limited quantities is more readily digested than ordinary bread, while succulent vegetables are permissible. One of the principal articles of diet is ordinary beef or mutton broth, to which, before being served, one or two raw eggs have been added and well beaten up. Of stimulants, nothing but dry white wines or clarets should be allowed at meals; pastry, puddings, and sweets must be, of course, studiously avoided. Such diet, however, may be suited for comparatively mild cases only. The graver cases, accompanied with almost complete apepsia, will be best maintained, per os, by the abovementioned broths, with eggs, followed by HCl, while superadded to these must be rectal alimentation. As in such cases the bowels are always torpid, this measure is quite feasible, and may be continued for a considerable period. Nothing will so benefit such patients as nutritive enemata properly made and administered. It appears to me a mistake to exhibit as such any food in a soluble condition without being predigested. The lower bowel certainly secretes no digestive ferments to change food to an assimilable condition, whereas its absorptive power is well known. For this reason only such food should be exhibited per rectum that may be directly absorbed. I have been in the habit of using from two to four ounces of pure glucose dissolved in starch mucilage, or even milk, as vehicle, three to four times daily, adding thereto one ounce of beef peptone, and stimulants if required. By such a course of rectal alimentation I have seen patients rapidly increase in weight and strength, and I have in my mind a case with complete pyloric stenosis who was carried to the hospital weighing eighty-nine pounds, and in three months thereafter left with a weight of one hundred and fifteen pounds, which subsequently increased to one hundred and forty-six pounds. I need scarcely mention that during rectal alimentation the bowels should be daily washed out with large enemata of lukewarm water.

I have already referred to the constipation supervening in such cases, and in order to obtain rapid absorption of food free alvine discharges must be procured. As we have to depend with such cases largely upon direct gastric absorption, the salines seem to be alone eligible for the purpose; the Carlsbad salts or sulphate of sodium dissolved in hot water, taken directly after lavage, may be preferably employed to that end. Medication seems but little indicated. Besides the HCl given freely after the albuminous food to make up for the lack of acidity necessary to form peptones, and pepsin always being present, there is but one remedy upon which we can rely to produce contractility of the muscular fibres, and that is strychnine. Its tonic properties in such cases cannot be too highly praised, while of the other remedy recommended in such cases—the condurango—I cannot say as much from my own experience.

As I have already stated, in the older and severer cases little is to be hoped from any means for establishing a smaller lumen of the viscus, or a return of the acid secretion of its glands; this at times may certainly be accomplished by the treatment employed with that view. The two measures to be relied upon for that purpose are massage and the faradic current. While the former appeals to the fashion of the period, and no doubt promotes a healthy nutritive circulation, the internal faradization of the stomach is the most rational and serviceable of the two. External bipolar faradization, practised and extolled by some, will probably accomplish just as much or as little as massage. Why it should be employed when internal faradization is so easily and safely accomplished, and with such excellent results, is to be wondered at. The stomach electrode employed by me consists of a small nickel-plated brass olive screwed on to a flexible copper wire about one yard in length, and insulated by being covered with rubber; it is easily introduced, either by the patient himself or the medical attendant. Before introducing the electrode, the patient should be directed to take one or two glasses of water. The current itself should be feeble at the beginning, and gradually increased until peristaltic movements are experienced by the patient, which may be even felt at times by the attendant through the external parietes.

As an illustration of what may be accomplished in cases of gastrectasis, I will now bring before you this patient:

R. M., aged 37, was born in Ireland, and is a stoker by occupation. He has been suffer-

ing from dyspepsia for about three years, for which he sought relief in various quarters. He came under my care about three months ago, complaining of epigastric fulness, anorexia, eructations, frontal headaches, furred tongue, buccal fetor, together with marked nervous symptoms, consisting of insomnia, melancholia, hallucinations of persecution, and has lost greatly in flesh.

Chemical examination of the gastric secretion revealed anacidity after trial meal, and on washing out the stomach large quantities of viscid mucus having an acrid odor were removed. Physical examination proved all organs, excepting stomach, to be normal. Inspection of stomach showed great distention, and auscultation of the inflated viscus revealed the lower segment about three inches below umbilicus. Siphoning out proved capacity of stomach about six litres. He states that during the time he is at work he drinks large quantities (gallons) of water. There was no tumescence or tenderness in pyloric region; no history of hæmatemesis and no cachexia. Diagnosis: atonic gastrectasis, with chronic gastric catarrh. Ordered suitable regimen, followed by HCl, also $\frac{1}{24}$ grain of strychnine t. d., daily lavage before principal meal, Carlsbad salt to be taken in morning while fasting, and internal gastric faradization, together with abstinence from excessive potations.

I will now extract some of the gastric secretions, and you will see that they give a decided HCl reaction. On inflation you will find the lower segment of the stomach one inch above the umbilicus, and when I measure the contents of the full stomach, which I have siphoned out before you, I find it to be about three litres. You hear from the patient that his appetite is good, that he sleeps well, and, though still inclined to melancholia, he is so in a much less degree than formerly, also that he has gained in weight and strength.

DISEASES OF THE LUNGS AND HEART: THEIR DIAGNOSIS AND TREATMENT.

By William B. Canfield, A.M., M.D.*

An article on the treatment of certain diseases in which nothing new or startling is offered may, at first sight, seem of no value; but when it is considered that a large experience in treating a certain class of cases must of necessity separate the effective from the non-effective treatment, it is hoped that the recording of such experience may be of some value.

In treating diseases of the lungs and heart, in hospital and in private practice, the physician unconsciously divides his cases into two classes,—the rare and the more common ones; and in treating these cases his extended experience both in diagnosis and treatment often gives him the ability to select the proper remedy with the best results.

In an experience of about five years at the Chest Clinic of the University Dispensary, in other public institutions, and also in private practice, I have seen many thousand cases of lung- and heart-disease, and, without the hope of making phenomenal observations, I wish to record the general line of treatment found to be most effective.

The most usual complaints made by a patient with a cough are cough, pain or constriction over the chest, difficulty of breathing, and shortness of breath. After a short history of these more prominent symptoms are noted, the length of time he has been sick, what the present complaint is, what made him seek a doctor, etc., a careful physical examination is made. Although the patient's own description of his complaint is often of little or no value in making a diagnosis, still the endeavor always is to find out what was the symptom that led him to seek medical advice. Most patients who cough, naturally refer the cough to the lungs, and it is not very usual for a patient to apply for treatment complaining of trouble over the heart, with the result of finding a heart-disease. Many of the cardiac murmurs are either discovered in the general examination, or are suspected by the pulse, general appearance, etc., and are rarely suggested by the patient's own history. A physical examination of the heart and lungs very often reveals nothing; in fact, patients who have been complaining for two or three days only, with a previous history of having been entirely well, are sometimes passed over without an examination in a large dispensary practice, or the examination is deferred to a later visit.

It is often surprising how theory and practice differ. Works on auscultation and percussion, and instructors, too, tell us in making a diagnosis never to be satisfied with an examination through the clothes, but to get as near the skin as possible. The young man who has just returned from the German hos-

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pitals, where implicit obedience with almost military precision prevails, who comes home with the idea of percussing, auscultating, and palpating the naked surface of each patient, soon learns the impracticability of this plan. Notwithstanding, teachers and writers to the contrary, there arise numberless cases where we are obliged, through feelings of delicacy, tact, etc., to examine our patients through thick clothing, corsets, etc.; and it is just as well to train the ear to these adventitious sounds as it is to learn the normal and abnormal physical signs. Many a would-be applicant dreads a life insurance examination, and it is the careful, kind, and tactful examiner who knows how to do his work to the best interests of the company and the timid applicant.

DISEASES OF THE LUNGS.

Acute Bronchitis.—In the spring and autumn, and especially during epidemics like the recent visitation of influenza, cases of acute bronchitis are very common, and generally after a sudden change in the weather patients from different parts of the city come complaining of about the same symptoms, which seem to have appeared about the same time and evidently due to the same cause. Such cases usually recover under the use of some simple expectorant mixture. A favorite one with me has been the following:

℞ Ammon. muriat., ʒss;
Mist. glycyrrhiz. comp., ʒiv. M.
Sig.—Take a dessertspoonful every three or four hours.

The dose is smaller in the extremes of life, and in severe coughs it is given every three hours, or even more frequently. This has become a very successful remedy in the large majority of cases of acute bronchitis of short duration and slight physical signs, and, in fact, all lung coughs seem to be improved by it. In a few cases it causes constipation, and then something else must be substituted, as some of the syrups, etc.

Scientific pharmacy has improved so markedly the preparation of drugs, that nauseous and bad-tasting mixtures are rarely prescribed by the physician, who is anxious to please the patient and make a reputation. Instead of liquid medicines, small capsules and tablet triturates have been found very convenient. Tablets of the muriate of ammonium and the compound licorice mixture are very efficient. When the secretions are with difficulty brought up, the use of senega is advised. The syrups are usually so sweet that in adult practice I often prescribe the fluid extracts, using mucilage of acacia or glycerin instead of water. Of course, in a dispensary practice, inhalations and external applications may be ordered, but they are rarely carried out. In private practice, a case of bronchitis usually does better in a room in which there is moisture, as steam from a kettle. Besides the internal medication, counter-irritation with Stokes's liniment, mustard, iodine, poultices, etc., form an important part of the treatment, and when there is a laryngitis with the bronchitis, inhalations of the compound tincture of benzoin, or oil of turpentine, poured on steaming water, give great relief.

When the secretions are abundant and not easily coughed up, I find turpentine in emulsion an excellent remedy, not so pleasant, perhaps, as terebene or terpine hydrate, but rarely failing to do good in properly-selected cases. The formula, with occasional modifications to suit particular cases, is:

℞ Ol. terebinthin., ʒii to ʒiii;
Mucil. acaciæ, q.s.;
Aq. cinnamomi, ʒi;
Aquæ, q.s. ad ʒvi. M.
Sig.—A tablespoonful in a little water every four hours.

Ofttimes the cough is of such an irritating character that these ordinary expectorant mixtures avail little; then recourse must be made to a narcotic in some form. Morphine, of course, is a powerful remedy, but it has serious objections, not the least of which is the tendency to form the habit. Codeine, a very useful alkaloid of opium, has the advantage of not constipating as much as morphine, and the codeine habit is not apt to be formed, as patients rarely recognize it as belonging to the opium family. This, united with the wild-cherry bark in some form, will stop an irritating cough, or, at least, prevent those frequent spasms of coughing. The virtues of the wild-cherry bark depend on the hydrocyanic acid in it, which acts on the pneumogastric nerve. A good combination is:

℞ Codeinæ sulphat., gr. viii;
Syr. prun. Virginian., ʒii. M.
Sig.—A teaspoonful in a little water three or four times a day, and at bedtime if necessary.

Of course, where the secretions are abundant, such narcotics do harm, but in the dry, irritating cough of nervous origin,—a cough that prevents sleep,—such a prescription is necessary.

Capillary Bronchitis in the adult is a very discouraging disease to treat, and too often proves fatal. The diagnosis is not always easy. It has been mistaken for pneumonia and pleurisy. The intense anxiety and dyspnœa of the patient is very startling to the nurse. The most important step is to keep the room filled with steam from a kettle, and use frequent inhalations of benzoin or turpentine. The great difficulty is to dislodge the tenacious mucus from the lungs. Expectorants do little and stimulants do much. In fact, in this disease you must pin your faith to constant stimulation and nourishment. We must also sacrifice elegant pharmacy and give nauseating remedies. Nauseating expectorants cause vomiting, which removes the bronchial secretion. The external use of mustard, Stokes's liniment, and large poultices is of the utmost importance. Even after the use of all these means, the patient, apparently strong at the beginning, will succumb to the disease.

Chronic Bronchitis, both alone and combined with *asthma*, can never be cured. Such cases return for treatment quite frequently, and it is only by palliation of the more acute symptoms that the patient can be kept in comfort. Spasmodic asthma is another disease that requires continual watching. In this class of chronic and incurable troubles I find the iodide of potassium an unpleasant but potent remedy. An attack of asthma often does well under the following:

℞ Potass. iodid., gr. lxxx;
Potass. bromid., ʒiii;
Aquæ, ʒiv. M.

Sig. –A dessertspoonful in a little water three or four times a day.

When the disease is a chronic bronchitis, whether with or without emphysema, I give the iodide of potassium in the following mixture:

℞ Ammon. muriat., ʒss;
Mist. glycyrrhiz. comp., ʒiv;
M., et adde
Potass. iodid., gr. lxxx. M.

Sig.—A dessertspoonful in a little water three or four times a day after meals.

This is an extremely disagreeable mixture, but patients will generally put up with it for the good it does them. The results with the nitrite of sodium, as suggested by Dr. Fraser, for use in chronic bronchitis, with and without emphysema, were not satisfactory. In some cases good was done, but in most cases not. In treating these chronic diseases the value of tonics should never be lost sight of. Fowler's solution of arsenic is an excellent remedy in these cases, as also is the occasional use of iron. It should never be forgotten in these cases to keep the portal system relieved of congestion by moving the bowels freely.

Pulmonary Consumption.—The reason that more cases of consumption are not cured is often because they are not recognized early enough. Whenever cures of consumption are reported, we should not forget that cases recover spontaneously. There can be no doubt in any one's mind but that prevention is better than cure. Unfortunately, in pulmonary consumption the physician is generally called in too late even to hope to effect a cure. Up to within a few years ago, consumption, when detected, was considered absolutely hopeless, and the physician's only duty was to try to alleviate the accompanying suffering and produce painless euthanasia. This plan of treatment was followed because the disease was recognized at too late a stage.

Although the judicious use of auscultation and percussion, and, in fact, of what is called physical diagnosis in general, has done so much towards mapping out with comparative accuracy the locality and extent of the lung lesion, still, even before these methods were used, the keen observer, by other signs and symptoms, often suspected the fatal disease at a time when the most skilful diagnostician could have found no physical signs of it. Now that that newer department of medicine, bacteriology, which too many consider impractical and as belonging to the pathological laboratory, has given us a more certain evidence of the early approach of consumption, we need rarely be in doubt. Ever since the discovery of the bacillus tuberculosis by Koch, few or no important observers will deny its causative relation to tuberculosis in general and pulmonary consumption in particular. The discovery by Koch has given us one solid fact. If we find the tubercle bacilli in the sputum, consumption is present; and if, after a sufficient number of examinations, the bacillus is not found, then we may conclude that we are not dealing with consumption.

Most cases of consumption that I have treated have died, but some have undoubtedly recovered, and on these I have based principally my line of treatment. Long before the first physical signs can be detected, bacilli have been discovered in the sputum.

As soon as the history of the case gives the slightest hint of a tuberculous history, I examine the sputum repeatedly, and if the bacilli are present, the case is attacked vigorously. The presence of elastic tissue in the expectoration is a very important diagnostic aid, and should not be overlooked in the search for bacilli. It may occur in other troubles than tubercular phthisis, but the continued presence of this tissue points strongly to this disease.

My plan is, first, to take the temperature at least twice a day. As long as there is fever the disease is progressing. I also have the patient's weight taken, and examine the urine for albumen. If there is fever, it is treated by absolute rest and an antipyretic, preferably acetanilide. If there is no fever, and little or no loss of weight, I try, by a carefully-selected diet, to keep up the appetite, and at the same time, where possible, I give cod-liver oil in emulsion or morrhuol, the latter an excellent substitute in warm weather for cod-liver oil. A pleasant combination is:

℞ Tinct. cardamom. comp., ℥ii;
Tinct. gent. comp., ℥iv;
Emuls. ol. morrhuæ, ℥xi. M.
Sig.—Dose, a tablespoonful.

If the cough gives trouble, it is best to try to quiet it, particularly at night, for the patient's rest is very important. If possible, avoid opiates, for while they lessen cough, they prevent the secretion already formed in the lungs from being expectorated. The least objectionable of the opium class is codeine. The following is not unpleasant and very efficacious:

℞ Codeinæ sulphat., gr. viii;
Acid. hydrocyanic. dilut., gtt. xx;
Syr. prun. Virginian., q.s. ad ℥ii. M.
Sig.—Take a teaspoonful every three hours, and in the night if necessary.

This does not constipate, and at the same time checks the tickling cough. Beechwood creosote has been highly extolled as a remedy for pulmonary consumption. It does do a great deal of good, but it is doubtful if its effect is antibacillary. I have used it to a limited degree, and the results have been encouraging. It may be administered in liquid form, with lime-water, with whiskey and glycerin, or in the form of capsules. I have also been much pleased with guaiacol, a remedy allied to creosote, and very palatable when taken with sherry wine. The combination I use often is creosote, spirit of chloroform, and alcohol, both internally and as a vapor to be inhaled on steaming water. If it is not an antibacillary remedy, it has a very soothing influence on the cough and the inhalations have the advantage of not nauseating the usually delicate stomach of the consumptive. Koch's inoculation treatment I have only used in a few cases of incipient phthisis, and in my zeal to benefit these patients I put them on a special diet and the guaiacol mixture, in addition to the hypodermic injections of tuberculin, so that their improvement may have been due to the combined treatment, and Koch's method could not take all the credit.

In the use of these methods I have been able to cure some cases,—that is, they have lived for several years without signs of the disease. It is probable that in these cases, the cavities becoming encapsuled by fibrous tissue, the tubercular action is cut off.

Cases that are doomed from the beginning require the utmost tact and skill in their management. Such cases are very discouraging. It has happened to me, as it has to many others, to utterly fail to benefit such cases, with the result of being dismissed, only to be recalled as the end approached. If a case is destined to die, it is the physician's duty to alleviate every unpleasant symptom at any cost whatever. Fortunately, such patients are cheerful and hopeful to the end. When the patient has no scruples against it, and often when he has, alcoholics should be used freely, for no danger of a habit is incurred. At the end a strong solution of cocaine (four to eight per cent.) sprayed in the throat, just before eating, may assist the swallowing, but this is staving off death by a very few days or hours only. The following is an excellent prescription when the cough is harassing:

℞ Morph. sulph., gr. ii;
Acid. hydrocyanic. dil., gtt. xvi;
Ol. cubeb., gtt. xii;
Syr. tolu, ℥ii. M.
Sig.—A teaspoonful at a dose.

The morphine in this prescription may be increased indefinitely, as such patients in the last stages soon become accustomed to it.

The gastric disturbances of phthisis are sometimes so marked, also the pharyngeal catarrh, that they may at first sight mask the real disease. Such cases come to us complaining of catarrh or dyspepsia (usually both). As long as the deception is justifiable, it is well to call the disease by these names. It is very likely that the continued swallowing

of tuberculous sputum affects the gastric juice secretion.

I have had occasional cases of what was apparently phthisis caused by the inhalation of dust. In one case I found bacilli in abundance, but the man gave up his occupation of miner and recovered, the bacilli entirely disappearing. In the sputum of all these cases the phagocytes could be seen, some of them fairly bursting with coal or other mineral dust. Such cases, while not originally tubercular, become so by the entrance of the bacilli into the alveolar walls wounded by the sharp edges of the crystalline dust particles. The tendency is to recover after the patient is removed from the influence of this irritating dust.

In spite of all newer methods of treatment, the best results are undoubtedly obtained by climatic treatment, properly conducted under medical supervision, if taken at the very beginning. G. Cornet* has recently published some inoculation experiments with tubercle bacilli in guinea-pigs. He inoculated twelve guinea-pigs with tuberculous matter; kept six confined in Berlin, and sent six to Davos, and all died alike. Such experiments are misleading. In regard to tubercle bacilli: in most of the cures vaunted by foreign (German) writers, improvement was gauged by the diminution in the number of bacilli found, and the reverse. This hardly seems to be the proper test. Although we cannot help recognizing the diagnostic importance of these bacilli, still we should keep in mind the lung or laryngeal lesion, the general health, appetite of the patient, as a key to this improvement. I have repeatedly observed, as many others have, that patients in whom there was absolutely no signs or symptoms of phthisis, as obtained by ordinary means, had their sputa laden with bacilli; while, again, in well-marked cases, not too far advanced, the bacilli were only to be found after many examinations. Again, as we should naturally suppose, laryngeal phthisis, even at its very incipiency, shows a much larger number of bacilli in the microscopic field than lung phthisis. From this we see the importance of the microscope in the diagnosis of the early stage of phthisis. Dr. G. Hunter Mackenzie† says that the number of bacilli found in the sputum of any case does not seem to bear any reference to the severity of the case. One case may apparently improve, and yet bacilli in large numbers be found, or another case may grow worse, and the bacilli be very scanty. In the latter case the spores, which are very tenacious of life, remain.

The fact that pulmonary consumption may undergo spontaneous cure should be remembered. Those who have seen and made large numbers of autopsies will remember having seen evidences of an old tuberculous disease, long since cured, a lung with signs of a healed cavity or with an old cicatrix. Vibert‡ found in the Paris morgue, in one hundred and thirty-one persons between the ages of 20 and 55, all of whom had died violent or sudden deaths, that evidence of phthisis existed in twenty-five, and in seventeen of these (sixty-eight per cent.) it was cured. These facts should be borne in mind by those who report cures from new remedies, basing their deductions on a few cases.

DISEASES OF THE HEART.

Cases of heart-disease are by no means so common as lung-disease, and yet it is surprising how often a serious valvular trouble will be discovered without the least suspicion on the part of the individual. Many of such cases complain principally of shortness of breath and occasionally cough.

The *functional* heart-troubles are, as a rule, not as severe, and they generally attract the patient's attention to that organ. Palpitation is a well-known symptom. It may come from an overloaded stomach, shock or excitement may cause irregularity of action, but whatever the trouble, the removal of the cause generally results in a cure.

The excessive use of tobacco causes violent palpitation and irregularity of action in some persons, and gives what is called the "irritable heart." Such cases, if not too far advanced, improve under lessening of the amount of tobacco and combined with the use of the bromides in large doses, and occasionally digitalis to regulate the heart's action. As it is inexpedient to withdraw tobacco entirely from an inveterate smoker or chewer, it is much better to lessen the amount gradually, and give directions as to smoking. For example, it is better to smoke on a full stomach, and cigars are often preferable to a pipe or to chewing. The pipe is objectionable because the stem so quickly collects the poisonous element of the tobacco, which is thus drawn into the lungs in a concentrated form. Smokers are always advised to clean their

* *Centralblatt f. Klin. Medicin*, No. 14, April 6, 1889.

† *Edinburgh Medical Journal*, January, 1889.

‡ *Lancet*, 1888, ii. 598.

pipe-stems frequently, and chewers are apt to swallow saliva mixed with tobacco. Such cases are constantly returning for treatment, any amelioration leading to a return of the excessive smoking, until the heart is permanently disabled.

Organic disease of the heart is recognized principally by the valvular murmurs, but the other symptoms or signs of valvular lesion should never be lost sight of. A valvular murmur is a very important diagnostic aid, but its importance should never be exaggerated, nor should a diagnosis of heart-trouble be decidedly made at the first examination, for it is no uncommon experience to find the patient's excitement attendant upon the first examination cause a murmur which is absent at future examinations, or the forcible beat of the excited heart may simulate a short murmur. Murmurs due to anæmia disappear with the use of iron.

The most common valvular lesion is mitral regurgitation, and it is especially common in persons under 30 or 35. The aortic valve is most commonly affected in persons over 45. At the latter valve occur the most serious troubles, while at the mitral the least serious are found. Of course, the regurgitant murmurs are the worst, causing congestion and dropsy, general or local. The pulse is a very important and often neglected indication to the effect of the valvular lesion. Much more could be learned from a careful study of the pulse in these diseases than usually is done.

In the treatment of these troubles there is not so much scope as in diseases of the lungs. In spite of the various substitutes and newer remedies, nothing seems to take the place of digitalis, and even strophanthus, which has just claims for excellence, occupies a second place. In spite of text-books and many authorities to the contrary, digitalis seems to do good in all the valvular troubles. It not only strengthens the systole and prolongs the diastole, but it serves to regulate the heart. Theoretically, it is contraindicated when practically it does much good. When there is no anasarca or ascites, and the symptoms of distress are not very severe, the tincture of digitalis is used in 10-drop doses in water three times daily. If the case is anæmic, and it often is, the digitalis may be alternated or combined with iron, or with iron and strychnine. If there is much anasarca or ascites, or both, and the stomach is not too sensitive, a tablespoonful of the infusion of digitalis is given three times a day, and compound jalap powder, 3ss to 3i, morning and night, is given for several days.

Some persons would not be able to bear the knowledge that they had heart-disease, while others have the good sense that will give them the care to live out their natural lives, in spite of the knowledge of their incurable disease. When possible, the patient should be informed of the trouble, its dangers, the care necessary in daily life, and what to do in an emergency.

1010 North Charles Street.

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*SOME CLINICAL EXPERIENCES WITH EUCALYPTOL.**

By I. N. Brainerd, M.D., Alma, Mich.

DURING the last ten years I have often prescribed eucalyptol in bronchial and pulmonary troubles. From this experience I have learned to put a high therapeutic value upon it in some respiratory affections,—viz., chronic bronchitis, chronic interstitial pneumonia, persistent cough, and to a less degree in tuberculosis.

The following list of cases, taken from my later experiences, furnishes a reasonable amount of proof of its utility.

Case I.—Miss B., aged 19. This lady called upon me in August, 1888. She complained of malaise, and some pain in her left lung. She had only a moderate cough and a limited expectoration. Her temperature was 99°. Auscultation revealed a harsh and catchy respiration in the upper lobe of the left lung. A trifling dulness could be discovered on percussion in this region. I gave this girl eucalyptol, and had her visit my office every two weeks for half a year. She so far improved as to lend expectation to her recovery. Then, school beginning, she started to school. As cold weather came on, she was chilled one day in school, and developed a severe croupous pneumonia. For this she was treated by a physician in her town; but not recovering, I was called to see her. Resolution did not take place as it should, and I advised the mother that the girl would never recover from this sickness. After a few weeks she died. I believe that, except for this intercurrent pneumonia, this girl would have continued to progress to a recovery from her phthisis. For a whole year she improved

* Read before the American Medical Association, Section on Medicine, at its Forty-second Annual Meeting, in Washington, D. C., May 5 to 8, 1891.

until she felt nearly as well and strong as ever. Then she sickened with pneumonia, and died in two months.

CASE II.—Mrs. T., aged 30. This lady called upon me in September, 1889. She was emaciated to a skeleton, had hectic fever, pulse about 90, cough with some expectoration, and tenderness on percussion over both lungs. The respiration was catchy and frequent. She had almost a loathing for food, and scarcely strength enough to come to my office. She had been ill for many months. I put her upon eucalyptol and cod-liver oil. She rapidly improved in all respects, and ceased to visit me after about two months. I had her under observation until all the objective symptoms ceased. I see her occasionally. She says my prescription has made a new creature of her. She is in her usual flesh, and is doing her work.

CASE III.—Mrs. M., aged 26, called upon me in September, 1889. She had a miscarriage in the spring. Upon rising from this sickness she took cold, and developed a cough and soreness through the lung, from which she did not recover all summer. Neither did her menses appear. She is from a consumptive family. These things alarmed her somewhat, and she applied to me for aid. Her respirations were broncho-vesicular and catchy. Her cough was quite troublesome. I gave her a prescription containing eucalyptol, and have had her under observation ever since. Her respiratory murmur is now all right, and she has menstruated once or twice since, and now seems to have gone into her menopause at this early age. She is in perfect health.

CASE IV.—Mr. B., aged 30, called upon me in December, 1889. He complained of a pain in his chest, and an inability to take deep inspirations with ease. Work involving the use of the pectoral muscles, as chopping, sawing, husking corn, etc., was painful. He was losing weight. Physical examination of the chest revealed a little dulness on percussion over the upper parts of both lungs, and a harsh and catchy respiration. I put this man upon eucalyptol, and watched the case for a year and more. The patient still complains, at times, of lameness in the thoracic parietes; but he now has less of the catchy respiration, and none of the dulness on percussion.

CASE V.—Miss McL., aged 16. In February, 1890, I was called to see this girl. I found her in bed with a temperature of 102°, a pulse of 120, and respirations 30. Cough and expectoration were present. She had *la grippe* a few months before, and had fallen into this state. Her respirations were broncho-vesicular and interrupted. I treated her symptomatically, and put her upon cod-liver oil at once. After about a month she began to walk out, and then I gave her eucalyptol besides her cod-liver oil. She continued to improve for some months, when I permitted her to go from my care to Ohio, where she has since remained. When I first saw her she was much emaciated; but now she weighs one hundred and fifty pounds. The cough and expectoration have ceased, and she is perfectly well. Several children in this family have already died of consumption, and I believe that this girl had incipient phthisis. The only thing lacking in the evidence is the demonstrated presence of the tubercle bacilli. I made no search for them.

CASE VI.—Mrs. P., aged 34, visited me in February, 1890. She had been failing for some months. She complained of pain in her right lung. The percussion note was normal, but the respiratory murmur was catchy. I put her upon eucalyptol and wheat phosphates. She soon began to revive in every way. The catchy respirations have ceased, and the patient has nothing to remind her of her former condition except her feeble endurance.

CASE VII.—Mr. Y., aged 27. In the latter part of 1889 this man was taken sick in Boston. He was treated for bronchitis, but finally had to go into a hospital. Here he heard the visiting physician, a college professor, say to a class of medical students, "We don't get hold of this case." After a few weeks' stay in the hospital he came to Michigan to accept the hospitalities of his brother. In February, 1890, I was called to see him. I found him greatly emaciated, with a temperature of 101°, pulse about 90, respirations 28, and a violent cough, raising about a pint a day of frothy and bloody sputa, containing mucus, pus, and blood. The sputa had a rank, gangrenous odor, and separated into two layers, one of mucus and blood, and one of foam. This was enough to make a diagnosis of gangrene of the lung. Physical exploration revealed a small area of flatness at the lower point of the right lung. The rest of the lung was a little super-resonant, because of its doing compensatory work. On several occasions this patient had alarming hemorrhage. I put him upon eucalyptol and cod-liver oil. He gradually improved under this treatment, and went to Canada to live upon his father's hospitality. Improve-

ment continued. And now, after a year, he says he is as well as ever.

CASE VIII.—Mr. B., aged about 60, consulted me in April, 1890. He is asthmatic, and had the grippe a few months before. He was left with a very aggravating cough. He had consulted three or four physicians without benefit before he came to me. I prescribed an emulsion of eucalyptol and hyoscyamus, and was gratified to hear from his own lips the next morning that he had spent the best night for several months. The cough ceased at once.

CASE IX.—Mr. A., aged about 40. This patient first came into my hands in July, 1890. He was emaciated, had a consumptive look, complained of pain in both lungs, and coughed some in the morning. He had just lost a brother from consumption. His respirations were jerky, and the area of hepatic flatness was enlarged. His greatest complaining was about a circumscribed point of tenderness in the greater curve of the stomach. This I believed to be a tubercular ulcer. I put this man upon eucalyptol and bismuth mixtures, and kept him under observation for a few months; but as he would not believe that anything ailed his lungs, and as his stomach was not bettered, he desisted from the treatment. It is to be said, however, that the respirations nearly ceased to be jerky during the latter part of the time that he remained under treatment.

CASE X.—Mr. H., aged 27, applied to me in January, 1891. He had had influenza, and had been left in a condition of prostration, and with pain in both lungs. I found the respirations catchy, and both lungs dull, especially in their lower portions. Strange to say, his temperature was normal, the pulse 64, and the respirations 16. Four years before an eminent physician told him that something was wrong with his lungs. He was obliged to quit work, and since has done but little. He is about five feet and eleven inches tall, and weighs only one hundred and thirty-five pounds. I put this man upon eucalyptol and cod-liver oil. Almost full resonance has been restored to the lungs, and the respirations are but slightly interrupted. There was never any expectoration. My diagnosis in this case was chronic interstitial pneumonia.

CASE XI.—Miss T., aged 29. I was called to see this patient in January, 1891. She had had pneumonia in Grand Rapids, Michigan, and had come to her sister's home a week earlier than her physician had told her she might. She took cold upon the train. This prevented resolution. I found her with a temperature of 101°, and respirations 24. The lower lobe of her left lung was flat upon percussion, and the breathing was tubular. This was some two months after the onset of her pneumonia. The expectoration was muco-purulent and abundant. I prescribed eucalyptol and cod-liver oil for her. She has steadily improved, and her prospects for an ultimate recovery are fairly good.

CASE XII.—Miss R., aged 21. On the second day of March, 1891, I was called off from the road to see this girl. About Christmas time she was taken with influenza. She partly recovered from this, and made two attempts to go back to school. Twice she failed and twice she went home. She was treated by another physician and discharged as cured. Three or four days later I was called in, as stated at the beginning of this paragraph, and found the following conditions: Temperature, 103°; pulse, 130; respiration, 24; free and muco-purulent expectorations; night-sweats; anorexia and great prostration. The respiration was catchy in both lungs and accompanied by large and small moist râles on both sides. The percussion note was somewhat dulled on both sides, especially in the lower lobes. I believed that the girl had slid from the influenza into catarrhal pneumonia, and was likely to fall into acute phthisis, and so informed the mother. I administered antipyretics and tonics, and later put her upon eucalyptol and cod-liver oil. I later examined the sputum and found swarms of the bacillus tuberculosis. The case has been in my care now two months. The temperature averaged the first month 101°; the second month 100.5°. The expectoration has grown much less. The respiration fell in two weeks to normal, and has so remained ever since. The pulse has fallen from 130 to 96, where it stays. This may be normal for her, for her two grown sisters have the same rate of heart-beat, and they are perfectly well. Her appetite is returning, and the bacilli have nearly disappeared from her sputa. The patient is still bedfast and in a precarious condition. Whatever the outcome may be, the fact is patent that the eucalyptol has done her much good. It looks as if it had averted the acute miliary tuberculosis, but also as if the patient were settling into a rapid phthisis, though no signs of cavities can be found and no râles are now heard. The respiration has ceased to be catchy, and has become smooth in all the lung except in the upper lobe of the left lung, where it is harsh

and tubular at this writing. It has been better here until a few days ago, when a sudden increase of expectoration indicated the rupture of a tubercle.

[*Later.*—Cavernous breathing is heard in both lungs. The bacilli have returned. Elastic tissue may be found in abundance in the sputa. The respirations have gone up to 26 and the pulse to 120. Death cannot be long deferred.]

CASE XIII.—Mr. A., aged 20, came into my hands the first of April, 1891. This case is far gone with consumption. He had a temperature of 102°, pulse of 110, and respiration 32. His expectoration was profuse and swarming with bacilli. He had night-sweats, tubular and jerky respiration in the left lung, pectoral pains, and was greatly emaciated. I had no expectation of producing any abiding change in this patient, but at once put him upon eucalyptol and cod-liver oil. In a fortnight his night-sweats were stopped, and the expectoration reduced one-half. The patient has been benefited by the treatment, but will die. He has had one hemorrhage since he has been in my care.

I am not putting eucalyptol forward as a specific for consumption, for it is not; but this experience has led me, as said in my opening paragraph, to put a high therapeutic value upon it in persistent irritable cough, chronic bronchitis, chronic pneumonia, and to a less degree in tuberculosis.

CASES I., XII., and XIII. were certainly tubercular. There can be but little doubt that Case V. was tubercular. V. is well; there is no prospect that XII. will get well; XIII. will die, and I. is already dead. Case VII. was a case of gangrene of the lung, and has recovered. Cases II., III., IV., VI., IX., and XI. had symptoms of incipient phthisis. All are living, and in as good or better health than they were a year ago. Case VIII. was a case of irritable cough. Case X. is a case of chronic interstitial pneumonia. VIII. is cured and X. is much improved.

Eucalyptol is very permeating. It is eliminated by the lung, the skin, and the kidneys. It can be smelled upon the breath, upon the clothes when changed, and in the urine. It is antiseptic. It has a healing effect upon the bronchial epithelium, and a sedative effect upon the peripheral nerves in the respiratory tract. It is because of these physiological effects that the therapeutic results are produced.

I administer it in five- to ten-minin doses in emulsion every four hours.

IODIDE OF POTASSIUM FOR THE DIAGNOSIS OF PHTHISIS.

STICKER renews an observation made by him a few years ago, which he has in the mean time confirmed, and successfully used for the diagnosis of doubtful phthisis. He finds that where a lesion exists at the apex of a lung, suspected by an impairment of resonance, and alteration in pitch or a harsh respiratory murmur, but without râles or blowing murmur, the latter may be produced by giving, for a few days, small doses of iodide of potassium. It seemed as if the drug stimulated secretion, especially in the neighborhood of diseased tissue, thus giving rise to râles. If moderate doses of the iodide be administered to a healthy person, no changes can be detected in the lungs; but in a case of diffuse dry bronchitis, in the course of a few days an extensive moist catarrh, with fine and coarse moist râles, results. Similar manifestations appear in the area of circumscribed pleural adhesions or pleuritic roughenings. Not rarely the evidences of local reaction are gradually obscured by the signs of diffuse catarrh. In four cases of suspected tuberculosis, in which repeated physical examination of the lungs proved negative, the administration of the iodide for diagnostic purposes produced distinct signs of localized reaction in one or both apices, with tuberculous sputa.—*Boston Medical and Surgical Journal*, June 4, 1891.

FUMES OF THE BROMHYDRATE OF AMMONIUM IN ASTHMA.

Being familiar with the favorable action of the fumes of ammonium chloride in some forms of bronchitis and naso-pharyngeal catarrh, the idea suggested itself to DR. MAXWELL to test the fumes of the bromide of ammonium in asthma (*Journal de Médecine de Paris*, May 31, 1891).

To obtain these fumes he employed bromhydric acid of a specific gravity of 1.7, and it is stated that but few inhalations are required to cause the immediate disappearance of the dyspnœa, while sometimes, he writes, by causing the inhalations to be used at the time a dyspnœic attack is threatened the asthmatic seizure has been entirely prevented. In order that the fumes should have a neutral reaction they should be passed through a wash-bottle.

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Leading Articles.

NATURE AND TREATMENT OF DIPHTHERIA.

IV.

FRESH evidence has been steadily accumulating to prove the invariable causal connection between Lœffler's bacillus and ordinary diphtheria, and since our last article Prudden's important communication has appeared, in which he concedes to this microbe the primary *rôle* in the etiology of this disease (*Medical Record*, No. 1067). Dr. Welch, of the Johns Hopkins University, has published the results of his and Dr. Abbot's studies at the Johns Hopkins Hospital, and add striking confirmation to the data on which have been founded the doctrine of the primarily local origin and development of the infection, a doctrine which, we observe, has been lately conceded by Cadet de Gassicourt, though opposed in the first edition of his masterly work ("Leçons Cliniques sur les Maladies des Enfants," t. iii., 1884).

"Of capital importance," says Professor Welch, "is the establishment of the fact that the diphtheritic bacillus develops only locally at the site of infection, and does not invade the tissues or the circulation. It is found only in the diphtheritic pseudo-membrane, and not even in the subjacent mucous membrane. Indeed, it is only the superficial parts of the false membranes which contain the bacilli. The determination of this fact gives at once a clear and decisive answer to the long-mooted question as to the primarily local or constitutional nature of diphtheria. The germ which causes this disease not only makes its first appearance and multiplies where the pseudo-membrane is formed, but it does not even subsequently invade the blood and organs. As we shall see later, the constitutional symptoms are due to the reception of a chemical substance or substances of remarkable toxic properties produced by the local development of the diphtheritic bacillus" (*Medical News*, May 16, 1891, p. 559).

We are, then, again brought around to the primary indication of treatment, made more and more certain and imperative as researches accumulate,—*to destroy the contagium in situ, before the microbes have had time to elaborate their poisons and infect the organism.*

Under this head, we need add but little to what has been said in previous numbers. It would seem that diphtheria primarily occurring on any accessible *cutaneous* surface might always be readily arrested by deep, thorough cauterization. Such cases are, however, very rare, and, when they occur, generally follow inoculation of a wound. The primary lesion is too often on mucous surfaces, which, like the posterior nares and the larynx, are not easily amenable to thorough topical treatment.

What shall be the treatment of the toxæmia resulting from absorption of the poisonous principles produced by the bacilli? Every physician is familiar with the change which often takes place at a variable time—two, three, or four days—after the first appearance of the patches; the sthenic symptoms, on which hope was based, give way to symptoms of prostration, and the system seems overwhelmed by a paralyzing poison.

Ignorant of the proper antidotes of this poison, if such exist, we can only combat it on general principles, by stimulants and tonics. The internal employment of corrosive sublimate in frequent doses of $\frac{1}{100}$ to $\frac{1}{4}$ grain, or of calomel ($\frac{1}{8}$ to 1 grain every hour), is no longer justified on the ground of a microbicide action exercised by these drugs, for the constitutional symptoms are not due to the microbes, but to their soluble products,

and there is no evidence that mercurials destroy these products in the blood.

The same judgment must be passed upon the sulphites and hyposulphites, counselled by Giacchi and Polli, in Italy, phenic and salicylic acids, vaunted by Bernier, in France, and Foutheim, in Germany, and benzoate of sodium, recommended by Helferich, Sanné, Love, and others.

If the internal use of corrosive sublimate has been attended with good results, these might very properly be attributed to the topical action of the mercurial while passing over the mucous membranes in the act of deglutition, and not to any effect on the blood. *Per contra*, there is reason to believe that the *tinctura ferri chloridi*, one of the best topical remedies, may exercise beneficial constitutional effects. Recent investigations (as those of Ferguson) have shown that the diphtheritic poison rapidly spoils the blood corpuscles; there are still lacking observations which directly show that tincture of iron retards this disintegration, although good authorities, basing themselves on large clinical experience, believe that this preparation, freely and continually administered, does have this power.

Dr. Whittier (*Boston Med. and Surg. Journal*) believes that this medicine, given so as to saturate the system, is the best that can be employed. Barach (*Med. Record*) prescribes hourly doses, in quantity varying from 8 to 25 drops, mixed with glycerin and water. Food and stimulants are administered before the iron, but not immediately afterwards, so that the iron may first have a local effect on the fauces.

"That now, after thirty years' constant use of the tincture of chloride of iron in both hemispheres, there is an almost unanimous verdict in its favor, renders it probable that the few who have not observed good effects have treated unusually bad cases, or have given the medicine in small and inadequate doses" (Dr. J. Lewis Smith).

The employment of pilocarpine (either by potion or by subcutaneous injection), first recommended by Guttman, has gone out of use. Archambault, Schmidt, Alfoldi, Jacobi, and J. Lewis Smith have pointed out the dangers of this treatment. Sudden filling up of the bronchial tubes, with secretion and heart-failure, have not unfrequently followed its use.

Quinine has been much prescribed in diphtheria, and when given in sufficient doses doubtless does have some tonic effect; it is, however, depressing in large doses, and, on account of its bitterness, is always repugnant to children. "It does not," says Smith, "seem to exert any decided action upon the local affections or blood-poisoning in diphtheria."

The same judgment may be passed on the internal administration of chlorate of potassium, a remedy, doubtless, too much administered, being of no specific value, and being toxic in large doses.

Alcoholic stimulants have an important place in the therapeutics of diphtheria, and many authorities, as Jacobi, recommend quantities that in health would be toxic. J. Lewis Smith does not hesitate to give a teaspoonful of good brandy or whiskey hourly to a child of 5 years, and Jacobi states that he has often seen children get well with ten ounces a day who were doing badly with three or four. Cadet de Gassicourt (*Traité Clinique*, etc., t. iii.) would give to a young infant from half an ounce to two ounces of old rum or brandy per day.

Caffeine, camphor, strychnine, and Siberian musk have been recommended to counteract depression and heart-failure. Jacobi believes musk to be the best stimulant in urgent cases of heart-failure. "If," he says, "10 to 15 grains, given [in thin mucilage] within three or four hours to a child of 1 or 2 years, do not restore a healthy heart action, the prognosis is bad."

Zannelis (*Bull. et Mém. de la Soc. de Méd. Pratique*, 1889), speaks favorably of strong infusions of tea or coffee in adynamic stages. Nourishment should be for the most part liquid, for obvious reasons: the digestive functions are depressed and the frequent ingestion of medicine and alcoholic stimulants more or less interferes with the secretion of gastric juice and the formation of peptones; the mechanical obstacles to deglutition are frequently considerable, and anorexia is generally a marked symptom in the toxic stage. Hence milk, beef juice, liquid peptones, raw eggs beaten up in milk, given in such quantities as can be tolerated and *not too often* to interfere with the administration of antiseptic medicines and of alcoholic stimulants, are especially indicated.

In this series of articles it has not been our purpose to take up the treatment of the different forms of diphtheria, or even to allude to the therapeutics of croup, but only to discuss the general principles of treatment in the light of the recent bacteriological researches.

THE TREATMENT OF AORTIC DISEASE.

IN aortic disease, whether the morbid condition be constriction, insufficiency, or aneurism, the arterial outflow is embarrassed, and unless the compensatory hypertrophy be sufficient through the extra power thereby given to the heart-muscle to insure filling of the arteries, the whole organism suffers in its nutrition and function. There is pronounced anæmia, which is manifested by general enfeeblement, and the usual subjective and objective signs. But there is something more than anæmia. The blood-depurating organs participate in the general disturbance of nutrition, and imperfectly eliminate waste elements; and to the poverty of arterial blood in the system is added a more or less toxic condition of the blood. The cachexia of advanced states is most marked.

Now that we are better acquainted with the conditions productive of aortic affections, we know that the latter are often the expression of a wide-spread disease of the arteries,—arterio-sclerosis; the victim of heart-disease has interstitial nephritis, and sooner or later becomes uræmic.

A peculiar state of mental irritability generally accompanies aortic disease (*faiblesse irritabile*); this may amount to mental alienation.

Among the symptoms of aortic disease are paroxysmal crises of dyspnœa, especially frequent at night, and attacks of præcordial pain, which arrest the patient in his occupation; if he is walking, compel him to stop and lean against some support. These heart-pangs, at first momentary, are dependent on exertion; they become intensified in extensive atheromatous disease of the aorta involving the coronary arteries, and in both the milder and severer forms constitute true angina pectoris. It may not be easy to give a satisfactory explanation of the cause of the pain in this distressing disease, or why it takes on an intermittent, paroxysmal character; but it is known that sudden deprivation of blood in a part is followed by agonizing pain,—witness the pain attending embolic obstruction of a large artery,—and it is known that such relaxant, vaso-dilator medicaments as morphine, nitroglycerin, nitrite of amyl most speedily and effectually relieve the suffering of angina pectoris; the presumption, then, is that the essential condition of this pain is a spasm of the arterioles, brought on by visceral troubles, emotions, or exertion, and converting, as Huchard somewhat singularly expresses it, *ischæmia* of the myocardium into *anæmia* of that muscle. There is now not merely deficiency of blood-supply; there is almost complete suppression.

The treatment of aortic disease is,—1, curative; 2, symptomatic.

1. The causal indication is generally impossible of fulfilment; in valvular cardiopathy, little can be done but to await the compensatory hypertrophy and meet symptoms as they arise. Overwork and worry, and all emotional states, should be avoided as aggravating existing lesions. By careful hygienic observances and a fortifying regimen, the heart should be made equal to its tasks. When this becomes impossible, the daily work should be levelled down to the capacity of the heart.

"In aortic insufficiency," says Dujardin-Beaumetz, "it is not the fault of the heart if there is anæmia of the arterial system; it is the fault of the valves, and you can do nothing to remedy this lesion. Your efforts will be directed towards combating the anæmia by a treatment designed to augment the local circulation in certain organs, and of these the brain is the most important."

In arterial cardiopathy, much can be done to fulfil the causal indication if treatment is begun early. The treatment, says Huchard, who has written voluminously on this subject, should be directed towards the arterial hypertension. We must spare the heart and diminish the peripheral resistances; forbid all medicines capable of producing vaso-constriction, such as ergot, chloral, lead, belladonna, digitalis, quinine, arsenic, aconite, belladonna, and hyoscyamus; proscribe tea, coffee, abundant drinks (which increase arterial fulness and tension), spirituous liquors and strong beers, pure wine, all table excesses, too rich and too azotized a diet, emotions, hard work, and all overwork.* Believing that arterial hypertension is in a certain measure of toxic origin, by reason of the incomplete elimination of organic waste matters, Huchard would proscribe broths, *bouillons*, and fat stews, which are veritable "solutions of poison" for all patients in whom urinary depuration is incomplete, and he would give the precedence to milk over all other articles of diet; while a mixed diet, consisting chiefly of white meats and fresh vegetables, should be recommended. Of medicines, those should be chosen which

* H. Huchard, "Maladies du Cœur et des Vaisseaux." Paris, 1889.

promote vaso-dilatation and lowering of arterial tension, such as nitroglycerin, iodide of potassium or sodium, nitrite of sodium and opium. All the accidents of arterio-sclerosis of the heart and aorta are amenable to iodide of sodium, which is curative if any one medicine can be regarded as such; the dose, according to Huchard, is 10 grains three times a day, to be continued for months, or as long as tolerance can be maintained.

2. The symptomatic treatment of aortic disease is largely concerned with the anæmia resulting therefrom, and the nervous and cerebral troubles. A leading indication, then, is to flush the cerebrum with arterial blood, and thus improve its languishing nutrition. Here we have one remedy of sovereign efficacy, which both energizes the circulation and relieves dyspnœa and pain. "Opium," says Gubler, "causes a peculiar excitation, gives fulness to the pulse, raises the temperature, augments the injection of the teguments, and promotes diaphoresis. The countenance brightens, the eyes become brilliant and moist, the pupils contracted, the skin covered with perspiration, then quiet sleep ensues."

No one who has had much experience in the treatment of the chronic aortic affections has failed to observe the charming effect of a hypodermic injection of morphine,—⅛ to ¼ grain; but it will generally be necessary to resort to these injections very often,—every day or two,—in gradually-increasing doses, and there will be danger of making the patient a victim of the morphine habit. It is, however, a choice between two evils in an incurable disease, which is steadily growing worse.

As morphine is constipating, laxative medicines will be constantly required,—cascara sagrada, syrup of senna, compound decoction of aloes, Carlsbad salts, etc., or even more energetic purgatives. Free depuration by the bowels is especially necessary where the kidneys are affected and uræmic symptoms present themselves.

Not much can be said commendatory of the free use of alcoholic stimulants in aortic disease, for they both promote granulo-fatty degeneration and arterio-sclerosis. If prescribed at all, they should be given rather to remedy a sudden depression of the vital forces than as parts of a routine tonic medication. Tobacco should be altogether interdicted.

Digitalis, so potent in mitral disease, is too much of a vaso-constrictor to be applicable to aortic disease with unfilled arteries, in which an important indication must ever be to diminish peripheral resistances. If there were a remedy, which, combined with digitalis, would counteract the action of the latter on the arterioles, it would enable us to utilize to advantage the cardio-tonic properties of digitalis in aortic disease. It can hardly be said that the combination with nitroglycerin has proved to be a success.

The dyspnœa and the angina pectoris, which so generally, if not inevitably, complicate aortic disease in its declining stages, are better combated by opium or morphine, nitroglycerin and nitrite of amyl, and iodide of sodium, and by a milk diet, than by any other treatment.

If digitalis is contraindicated in aortic disease, the same may be said of strophanthus and adonidin; at the same time, in the period of asystolism, when the pulse is irregular and rapid, and vascular tension is low, these heart tonics, judiciously administered, are just as useful in rallying the failing heart-muscle as in the asystolism of mitral disease.

PREDIGESTED FOODS.

THE problem of feeding the sick is often one of the most difficult the physician has to solve. Following Sir Wm. Roberts's demonstrations of the value of pancreatic preparations in artificial digestion, great progress has been made, but there is still scope for further advance. Commercial enterprise has done much both to forward and to retard the movement, for while, on the one hand, manufacturers, possessing a scientific spirit, have endeavored to produce artificial foods which should not alone be profitable to them, but also of service to the sick, other manufacturers continue to place on the market, with high-sounding pretensions, preparations which no longer represent the best attainable results. In a recent paper before the Philadelphia County Medical Society, Professor Chittenden, of Yale, reported on the nutritive value of the best-known beef preparations in the market. Setting aside their value as stimulants, whatever that may be, he again conclusively demonstrated the practical worthlessness as nutritives of the group of "beef extracts," "beef juices," "liquid foods," etc., made after Liebig's formula, or consisting, as do some more modern preparations, of blood and alcohol. On the other hand, preparations which contain partially-digested beef fibre, reduced to powder by desiccation, were shown to ha-

considerable nutritive value; varying from one hundred and forty-seven per cent. in the case of beef peptonoids to four hundred per cent. in the case of Mosquera's beef-meal, estimating on a standard of one hundred per cent. for lean beef. Of course, laboratory analysis cannot replace clinical experience; but the two together will enable a just estimate to be made as to the field of usefulness of preparations of different types, and in assisting us to determine to which element in any preparations its particular usefulness is to be attributed. The preparation for ready assimilation without much further expenditure of energy by the patient, which is the characteristic of the peptone group of foods (using the term broadly), is unquestionably a great factor of their power for good.

Whether digestion by the pineapple ferment, as in Mosquera's beef-meal, will be equally efficacious with digestion by pancreas ferment, as in the older preparations, remains for clinical experience to decide. There is *a priori* no reason to doubt its efficacy, and the reports thus far available seem to confirm it. Should it be established beyond question, the highly concentrated character of this food—four hundred per cent. in Chittenden's table—will render it of especial value in wasting diseases, such as phthisis pulmonalis and diabetes, in which a nitrogenous dietary is strongly indicated. In carcinoma, and for rectal feeding, in cases of gastric ulcer, for example, it will have a decided usefulness. In acute febrile conditions, associated with gastro-intestinal disturbances, on the other hand, the Liebig group of foods have a limited, but none the less certain, value in carrying the patient over a crisis in which absolute nutrition in the sense of repairing tissue-loss is of less moment than the liberation of energy in the nervous and circulatory apparatus. Like alcohol, caffeine, and strychnine, these foods contain principles which are available for such purposes, and are quickly taken up by the blood and brought into service. Their small nutritive percentage is in this case rather an advantage than otherwise.

It must be distinctly remembered, however, that we are not feeding the patient with these preparations, and that his tissues will be entirely consumed unless we repair them by other means. Thus in each individual case it becomes a matter of nice judgment to determine how long the patient may be allowed to go without food, or with a minimum of food, while his organic functions are maintained by his stores of reserve energy, assisted and guided by therapeutic administration of drugs, whey, fruit juices, and beef extracts. The food preparations may be advantageously combined at times with the stimulant preparations. Thus peptonized milk or peptonized beef, prepared at home, may be alternated with home-made beef-tea, or the two kinds of preparations be mixed and given together. A quite important point in cases requiring nice management is to give but small quantities of food, and to allow a sufficient interval to elapse between feeding times.

A patient given 4 ounces of food every hour will often vomit it all, when 2 ounces or less every second hour will be retained and utilized. While a return to the practice in vogue before Graves, "fed fevers" would be unwise in the extreme, yet it is well to remember that even "fevers" may be "overfed."

THE VALUE OF AGARACINIC ACID AS AN ANTIHYDROTIC.

THE antihydrotic properties of white agaric (*Polyporos officinalis*, Fries) have been long known. Schmiedeberg and Fleury, in 1870, found in this fungus a resin and an acid giving the formula of $C_{16}H_{28}O_5$ to the latter. In 1883 E. Jahns extracted a bibasic, triatomic homologue of malic acid, to which he gave the formula $C_{16}H_{30}O_5.H_2O$. In 1881, Norris Wolfenden, and in 1882, Dr. Young, experimented with the crystallized principle which they had extracted from an alcoholic tincture of agaric, which they denominated as agaracine, and which they stated to be an active principle of agaric; finding that this principle had the power of notably diminishing night-sweats, calming cough, reducing fever, slowing the pulse, while at the same time being slightly laxative. Seifert, also experimenting with this principle, agaracine, in the pill form, in doses of $\frac{1}{12}$ grain, while noting a diminution of cough in cases of phthisis, did not succeed in all cases in arresting night-sweats, although doses of from $\frac{1}{10}$ to $\frac{1}{8}$ grain succeeded better in his hands.

Proebsting, later, in 1884, in comparing the action of atropine and agaric acid, concluded that the latter was twenty times less efficacious than the former.

In 1885, Senator wrote that the remedy in his hands was by no means infallible in arresting night-sweats, that it occasionally caused diarrhœa, and that it should always be associated with about $\frac{1}{6}$ of a grain of opium. Finally, in 1886, Piernig concluded that agar-

acine was always efficacious in the diminution or suppression of the night-sweats of phthisis, without its producing any modification in the frequency or the rhythm of respiration or without interfering with the normal functions of the skin or pulmonary exhalation. Thus, it is seen, as we have already a number of times noted in previous numbers of the GAZETTE, that the principles of agaric are of the most marked activity as antisudorifics, and we have mentioned that the purgative effects which sometimes follow the use of agaracine are in all probability attributable to the presence of the impurity termed agaracol by Schmieder. This latter substance, however, according to Hofmeister, is quite negative. In the *Bulletin Général de Thérapeutique*, May 30, 1891, Dr. Combemale states that a substance placed on the market under the name of agaracinic acid should be regarded as a perfectly pure principle of agaric, and that this is the only antisudorific element in the white agaric. Hofmeister had, in 1889, already demonstrated that in warm-blooded animals agaracinic acid produces progressive paralysis of central origin, with reduction in the force of the heart and surprising or marked diminution of cutaneous secretion. In the dog 15 grains of this acid produced vomiting and diarrhœa. After the subcutaneous injection of 4 grains of agaracinate of sodium in rabbits, marked somnolence was produced, with slowing of the respiration and increase in their volume. In more marked degrees of poisoning respiration assumes the dyspnœic type, while at the same time the blood-pressure is first increased and then diminished through stimulation, and then final paralysis of the vaso-motor centre and the pneumogastrics. Ordinarily death follows from arrest of the respiration. Experiments made directly as to the action of agaracinic acid on the cat showed that, like atropine, this substance paralyzes the nervous apparatus of the sweat-glands, although, unlike the latter, it has no marked action on the heart or on the pupil or on the salivary or lachrymal secretions. Hofmeister also showed that agaracinic acid was a powerful local irritant, and when injected subcutaneously produced marked inflammation, which tended to pass into suppuration. Professor Kahler, in Prague, employed agaracinic acid in doses of ¾ of a grain, or even 1½ grains, in a number of cases of phthisis, and found that, although it occasionally produced slight transient nausea, no symptoms of poisoning were produced; and in fact the dose might be increased up to 3 or 5 grains without hurtful effects, and was in such doses very reliable in reducing night-sweats. Finally, also, Klemperer likewise confirmed the value of agaracinic acid as an antihydrotic, at the same time finding it to be free from danger.

It would thus seem that the antisudorific properties of the white agaric known for so long a time, and which were first supposed to be located in agaracine, and then in agaric acid, are now finally, with considerable show of probability, confined to agaracinic acid. This principle may be extracted from the white agaric by 90 per cent. alcohol, which precipitates a great part of the resinous matter out of solution, and then purified by repeated crystallization in absolute alcohol. It then occurs in the form of a silky-white powder composed of microscopic prisms, is inodorous, tasteless, and melts at 130° C. It is soluble in alcohol, less soluble in ether, acetic acid, and cold water. It is very soluble in boiling water, from which it is again deposited on cooling. It is a triatomic and bibasic acid, which at 140° is partially converted into an anhydride. It forms salts with sodium and potassium and silver.

Dr. Combemale reports seventeen cases, which seem to show that agaracinic acid is itself possessed of marked antisudorific properties, arresting sweats in pulmonary tuberculosis and in other forms of poisoning or infection. In pulmonary tuberculosis, he suggests, it succeeds in producing relief from this distressing symptom, even in the final stage of the disease. Doses of ⅓ to ¾ grain given in pill form are quite sufficient to produce this effect. Dr. Combemale's observations have showed that the continued employment of this remedy produces no disturbance either of the digestive organs or of the general health. One of his cases received this substance in pill form daily for more than a month. Dr. Combemale further calls attention to the fact, which has been noted in other antisudorifics, such as the tellurate of sodium, that cessation of night-sweats will lead to dyspnœa in some cases. This, however, is not to be regarded as the effect of the remedy, but to a suppression of the eliminating function of the skin. Dr. Combemale's cases seem to show that its action on the sweat may be manifested two hours after the administration of the dose, the maximum effect appearing about five hours after the administration, and lasting for about six hours more.

Finally, Dr. Combemale concludes that

agaracinic acid is superior to any other remedy used for the suppression of night-sweats, and that, being free from the resins and the oils which contaminate agaracine and agaric acid, it is the only principle of white agaric which should be used for the suppression of night-sweats.

Reports on Therapeutic Progress.

TREATMENT OF HYDROCELE BY CARBOLIC ACID INJECTION.

At the meeting of the New York State Medical Association, recently held in Brooklyn, Dr. S. E. Milliken read a paper upon the treatment of hydrocele, in which he contrasted the method of treatment by injections of carbolic acid with the radical or cutting operation (*Medical Record*, June 20, 1891).

The radical or cutting operation of Volkmann, and its various modifications, he said, while usually successful in relieving the hydrocele, required the use of an anæsthetic and a week or more in bed should suppuration occur. The method of Levis, by carbolic injection, was practically painless, confinement to bed was in no sense essential, and unless an inordinate amount of carbolic acid (over thirty minims) were used, sloughing ought never to occur. The simplest and most efficient apparatus for the purpose was a small trocar and a hypodermic syringe. After thorough evacuation the syringe was screwed on to the canula, and the injection could thus be made without a single drop of the acid coming in contact with the skin of the scrotum. When from five to twenty-five minims of pure carbolic acid were distributed over the whole serous surface (two or three, minims in each place) nothing more than a sense of warmth was experienced by the patient. After removal of the canula, slight kneading of the sac might be made to insure thorough coating of its walls with the irritant. Usually within twenty-four hours the height of the inflammatory reaction would have been reached; and thus, if a laboring man were injected on Saturday, he would be entirely able to go to his work as usual on Monday morning.

Of fifty-four cases thus treated by Dr. Milliken, at the Hospital for Ruptured and Crippled, nine were never seen after the injection, five paid one visit within the first week only, and four were at present under observation. All the remaining thirty-six could be set down as completely cured; and of these, twenty-seven had one injection, four had two injections, and five had three injections. In no case had sloughing occurred, and not one of the patients lost more than twenty-four hours from business. From two to six weeks was necessary for absorption of the exudation to take place, and thickening of the sac might remain much longer than this.

The conclusions reached by the author were as follows: 1. Carbolic injection is a safe method for the cure of hydrocele. 2. It is practically painless. 3. The patient can attend to business without more than one day's delay. 4. The disagreeable effects of an anæsthetic are avoided.

Dr. William R. Ballou thought that the injection of carbolic acid was greatly preferable to that of iodine. Hare had collected a large number of cases in which great destruction of the tissues, and one case in which fatal iodine-poisoning, was caused by the latter. The danger of iodine-poisoning seemed to him to be the most serious objection to the use of this agent. He should like to call attention to one point, and that was, that thin sacs do not require carbolic injection. At the New York Polyclinic, Dr. Fluhrer used an aspiratory needle three inches long and of rather large calibre in connection with the hypodermic syringe. A solid metal staff having been introduced into the urethra, the fluid was evacuated and a large quantity of carbolic acid (from sixty to eighty minims) was injected into the sac. It seemed to him, however, unnecessary to use such a large amount when such excellent results as those reported by Dr. Milliken could be obtained with a small amount. In cases of Bright's disease the method by carbolic injection was especially indicated, since the Volkmann operation required the use of an anæsthetic, and it was well known how dangerous ether was when disease of the kidneys was present.

Dr. William T. White said that he had never used carbolic injection, but had always depended on the use of iodine, from which he had never seen any of the bad results that had been spoken of. The first injection was almost always successful, so that it was seldom necessary to repeat it. Sometimes, however, considerable inflammation was occasioned, necessitating the patient's remaining in bed for two or three days, and if this could be avoided by the use of carbolic acid it was certainly a point gained.

Dr. Milliken said that he had omitted in the paper to say that he usually directed a suspensory bandage to be worn for the first two

weeks, and that he employed for the injection equal parts of glycerin and carbolic acid. It was important that there should always be sufficient fluid to make a perfect solution. He preferred to use ten to twenty minims, and repeat the injection a second, or even a third time, if necessary, rather than to use a large quantity of the acid a single time. In cases where the trouble returned, it was always noticeable that the hydrocele was never as large as it had been originally. He had never had any personal experience with the use of iodine, but in all the cases that he had seen treated in this way by others the pain inflicted was much greater than when carbolic acid was employed. In regard to iodine, he was not so much in fear of the sloughing liable to be caused by it as of iodine-poisoning. The painlessness of carbolic acid he thought was a great point in its favor. With it, it was never necessary to use cocaine, as the puncture of the small trocar did not cause any more inconvenience than that of the hypodermic needle for the introduction of cocaine.

Dr. John Murphy said that he had known of three or four cases in which carbolic acid used in this way was followed by very bad effects, especially on the kidneys. About a year ago he had seen a case of this kind terminate fatally, and he could not attribute the death to anything but carbolic-poisoning. It was very difficult to eliminate carbolic acid from the system, and it was very apt to have some destructive action and to select the kidneys for this. In his opinion there was nothing better for the treatment of hydrocele by injection than Lugol's solution, and he had never seen any bad effects result from its use.

THE TREATMENT OF THE CEREBRAL ATROPHIES OF CHILDHOOD.

At the meeting of the New York Neurological Society, held June 3, 1891, Dr. M. A. Starr read a paper on the cerebral atrophies of childhood, with special reference to surgical treatment (*New York Medical Journal*, June 20, 1891).

He said that the propriety of surgical interference in cases of cerebral disease was one of immediate and increasing interest, and therefore one which should be frequently discussed by those who were in a position to reach decided opinions. There were so many forms of cerebral disease in which the possibility of operations might be admitted that a general discussion of the subject did not produce definite results; therefore he would devote his paper to a particular class of cases,—viz., the cerebral diseases of infancy and childhood. The immediate result of certain cerebral diseases in infancy was to produce definite symptoms, giving rise to three types of cases,—first, cases of hemiplegia, with or without athetosis; secondly, cases of mental defects of various grades; thirdly, cases of sensory defects of various kinds. And since epileptoid seizures of the *petit-mal* or *grand-mal* type were frequently met with in any of these forms, and might perhaps be the particular symptom in regard to which advice was sought, it was evident that the discussion must include the surgical treatment of non-traumatic organic epilepsy in children. The symptoms of the first class were the sudden development of a unilateral paralysis after a series of convulsions, attended by high fever, other febrile symptoms, and a period of unconsciousness of varying duration, then a gradual improvement in the paralysis after all active symptoms of the onset had subsided. Finally, there was a stationary condition in which the face was hardly affected in its voluntary or automatic movements; the speech was usually regained if it had been lost; the arm was quite seriously paralyzed, the fingers being stiff and awkward, and sometimes being in constant, slow involuntary motion; and the leg was held rather rigid, so that the child limped in walking and sometimes had a club-foot. In all cases the paralyzed limbs were found to be affected in their growth and development, so that they were smaller, colder, stiffer, and weaker than the others; the reflexes were exaggerated, but the electrical reactions were not quantitatively changed and sensation was normal. This condition remained through life as a permanent defect. In over half of these cases epileptic attacks were of frequent occurrence. The cases which dated from birth must be divided into those in which there had been evidence of traumatism during labor and those in which there had been nothing about the delivery sufficiently unnatural to awaken a suspicion of trauma. In the former class it might be stated that cerebral hemorrhage—usually meningeal—was the cause of the symptoms. In the latter class it was probable that an intrauterine encephalitis or some unknown cause had prevented the fœtal brain from developing. The degree of spontaneous recovery in any case could be pretty well determined by an examination at the end of the second year; but it was evident from data on the question that a complete cure never occurred. The fits in organic epilepsy were more likely to be frequent and severe than in idiopathic epilepsy. These attacks did

not destroy life, but, of course, rendered life a burden, and almost any means for their relief was countenanced. The second class of cases presented mental defects rather than physical symptoms,—defects which could not be educated out of the patients, in which no amount of training could produce an appreciation of the fitness of things. The third class presented no motor or mental deficiencies. Those affected were capable of training, but had defects of sensory perception which indicated gross cerebral disease. Many cases of deaf-mutism belonged to this class, also cases of hemianopsia. In regard to this latter condition, the author gave the history of the case of a little girl, aged 12 years, who had suffered all her life from frequent attacks of *petit mal* and occasional attacks of *grand mal*. She had never been able to see objects approaching her from the left side. It was learned from the mother that the child had been born with much difficulty, that the labor had been prolonged, and that the head was greatly misshapen and had a large caput succedaneum over the posterior part. When the child's head was inspected it was found that there was a perceptible flattening of the skull over the right occipital region. The eyes, when examined, showed a contraction in the visual fields. It seemed reasonable to suppose that this patient had a defective development of the right occipital lobe of the brain, and that this involved the cortex and also the subcortical tract. Wilbran had shown that a purely cortical lesion produced symmetrical defects in the visual fields, while subcortical lesions produced asymmetrical defects. The pupils, in the cases reported, responded to light thrown upon the blind field of the retina; hence the lesion was not in the optic tract. There had never been any hemianæsthesia or hemiplegia; consequently the lesion was not in the thalamus or near the internal capsule. The patient had been brought for treatment for epilepsy, and it was an important question to decide in regard to the possible benefit of surgical interference. The author thought that any solution of the problem of operative treatment must be based upon two considerations,—first, the pathology of the cases; and, secondly, the results of experience when such operations had been done. From the records of the pathological conditions found, two facts were elicited,—first, that the different clinical types were due to the different situation of the lesion rather than to its varying nature; secondly, that the various processes of disease had, as a fairly uniform result, a condition of atrophy with sclerosis of the brain. In cases of the first type the sclerotic atrophy involved the motor area of the brain, the central convolutions and their immediate vicinity, including the tract arising from them, and usually the basal ganglia as well. In cases of the second type, the sclerotic atrophy involved the anterior portion of the brain, and sometimes the entire hemisphere to a greater or lesser extent. In the third type, the sclerotic atrophy involved the posterior and lateral parts of the hemispheres. The hypothesis was that the origin of the disease lay in some interference with the blood-supply of the part, since it had often been evident that the atrophy was limited to the region nourished by blood reaching it through one arterial trunk. This hypothesis was weak from the fact that at autopsies it was very rare to find vascular lesions in the brains of infants. Consequently the pathogenesis of these defects was as yet quite obscure. From the records of operations done in six cases of the first type it was evident that this method of dealing with the disease offered no relief. In regard to the second type, the author thought that the pathology contraindicated an operation. To the third type, cases of sensory defects, there were no facts of a surgical kind to present, but, judging from the pathological resemblance between them and the first two classes, there was no reason to expect any different result from surgical treatment. It was concluded: (1) That in infancy and childhood, mental defects, hemiplegia, and sensory defects, of a year's duration, were usually due to an incurable atrophy of the brain-substance. (2) That in such cases surgical treatment could not afford any relief, for there was no probability of an increase of intracranial pressure to be relieved, and the pathological state was one that could not be treated. (3) That the sudden onset of such symptoms in childhood, while awakening a suspicion of cerebral hemorrhage, did not invariably indicate it and could not be made the basis for an operation, unless many other facts made the diagnosis quite clear. (4) That the occurrence of epilepsy in such cases might be made the basis of an operation, for, while the epileptic attacks were of organic origin and would persist, their frequency might be much diminished. In such cases the opening in the skull should not be filled by bone. It had seemed possible to the author that the existence of a movable connective-tissue valve of scalp covering the opening in the skull and varying in its tension might have something to do with the cessation of the fits. In watching such a valve he had noticed great variation in

its tension, and the idea of it as a safety-valve had been forced upon him. Finally, he would urge upon neurologists the necessity of very great caution in recommending surgical interference in the class of cases which belonged to cerebral atrophies.

DR. B. SACHS said that on the whole he was in agreement with the author of the paper, but that some of his views might be open to criticism. He thought that as a general proposition little could be gained in the treatment of the class of cases referred to by surgical operations, but that there was a decided field for the surgeon if the case was taken in hand early. He thought there was much more hope for these patients if they could be operated upon at the time of the initial lesion, before degenerative changes had taken place. He considered it worse than useless to operate in a case of sclerosis or proencephalia. He thought Dr. Starr was mistaken in saying that in every case there must be wide-spread secondary degeneration. Secondary degeneration did not follow many diseases of the brain, but not in all cases he was satisfied. The speaker was convinced that much good was done by the puncture of old hemorrhagic cysts; he had seen the epileptic attacks very much diminished by this procedure. In the radical treatment of cerebral atrophies, unless the entire diseased area was removed, no good could come of an operation. In regard to the safety-valve question, nothing could be gained by such an operation unless the dura was opened; even then, if epileptic attacks were to be cured, the centre from which they emanated would have to be excised. This latter operation might leave the patient with a paralysis, but with a cure of the epilepsy; which of the two was the greater evil would have to be determined by those most interested. Where there was not thought to exist a sclerotic condition, and where it was supposed the initial lesion could be attacked, an operation might be done, but it must be borne in mind that children did not bear surgical operations upon the brain as well as adults. The speaker did not see how Dr. Starr could make the statement that the growth of the skull and that of the brain were necessarily synchronous, when their growth was independent each of the other; however, when the skull ceased to be yielding, the brain was certainly at a disadvantage.

DR. H. D. CHAPIN said that too early closure of the fontanelles was supposed by some to prevent evolution of the brain, but it was a question whether the closure was due to the microcephalia or the reverse. As to an operation in these cases for the purpose of giving the brain more room, the speaker thought it just as well to let them alone, considering that it was not known whether the early closure had anything to do with the condition or not.

DR. E. D. FISHER was in favor of an operation in the class of cases referred to by the author of the paper. As soon as the first symptoms, such as convulsions, and so on, appeared, even if this was during the first week of life, he would recommend operation, and at any time if the case was seen before degenerative changes had taken place; even then he was not sure that an operation might not do some good towards altering cell-growth and promoting improvement. Of course, if a case was diagnosticated as one of proencephalia, an operation should not be done. The speaker reported about thirty cases of hemiplegia in which the measurements of the brain showed a very appreciable diminution on the diseased side. He thought that this was conclusive evidence of the condition, and that by operation something might be done to excite nutrition and growth.

DR. W. R. BIRDSALL was glad to indorse Dr. Starr's conservative views in regard to operative procedures in this class of cases. Dr. Sachs had referred to irritation of the cortical lesion, which might set up beneficial changes. The speaker thought that it could just as well bring about a worse condition of affairs. As to many of the so-called atrophies, he thought that arrest of cerebral growth might take place without a true atrophy, that the cells retained their original condition without degenerative changes taking place. He thought that many of the cases of retarded development were of this type, rather than of sclerotic atrophy. As to operating in such cases, he would like to know what operators expected to find, and when they had found something what they would do with it, and what good they could expect from such procedures. He thought that Dr. Starr's idea of a safety-valve for the purpose of giving the brain more room was far-fetched, inasmuch as the original trouble, whatever it was, caused an arrest of both brain and cranial growth. He might operate in cases of disturbance of the circulation, where the indications were clear and where the point of disease was likely to be found, but there was a great difference between operating in such cases and splitting open a microcephalic skull for the purpose of letting the brain grow.

The PRESIDENT had seen many operations for infantile atrophies, and had yet to see any

good come of it, and, furthermore, he could not see how benefit could be expected from surgical interference in such cases. How could an operation do any good at the time of an inflammatory attack of the brain? and how could it be of service when secondary changes had taken place? If the sclerotic area was cut out, would there not be left behind a similar condition of cicatrix and contraction? He thought that for records of cure in cases of operation for cerebral epilepsy to be of value they should not be reported too soon, for the history of some cases without treatment showed spontaneous recovery, and the attacks had not returned for years. He was satisfied that Dr. Starr was laboring under a misapprehension in thinking that premature ossification of the fontanelles induced brain-pressure, although cases of epilepsy had been reported as due to this cause. He thought that more was expected in the surgery of cerebral atrophies than would ever be realized.

DR. STARR said it was all very well to talk of operating early in these cases, as one of the speakers had proposed, but who was to make such an absolute diagnosis and to decide when and when not to carry out such serious procedures?

CREOSOTE IN SUBCUTANEOUS INJECTIONS.

As the treatment of tuberculosis to-day occupies the first place in point of importance and interest, and since creosote is a remedy whose use has been highly extolled in the treatment of this disease, it is not without interest to call attention to the characteristics which must be possessed by the specimen of creosote to render it suitable for subcutaneous employment. The characters of the officinal creosote which possess that character only in name have been made the basis of a study by DR. CHOAY, whose results are published in the *Journal de Médecine de Paris* for May 24, 1891. Officinal creosote should have a specific gravity of 1067, should be neutral to litmus-paper, giving with neutral perchloride of iron a green coloration, distilling at 200° to 210° C., and derived solely from wood-tar. Dr. Choay maintains that if the specimen of creosote gives a blue coloration with a test solution of perchloride of iron, the creosote has not been obtained from wood-tar, or has in some way deteriorated or has been adulterated. So also if its density is much above or much below 1067, or if its point of distillation varies much below 200° or 210° C., it likewise is not suited for subcutaneous employment. After detailing a number of methods as to the manufacture of creosote and the way in which it may be contaminated by foreign substances, he gives the following method for preparing a perfectly pure creosote: Taking the beechwood creosote he commences by distilling between 200° and 210° C., but as this distillation develops a small amount of phenic acid, it is necessary first to eliminate this impurity; to accomplish this he makes use of the different degrees of solubility in glycerin and water. If one adds to glycerin a creosote containing phenic acid, and then water is afterwards added, the creosote separates while the phenic acid remains in solution. It then only is necessary to separate the creosote and to distil it in a vacuum. By this process a liquid is obtained which is colorless, has an agreeable odor, resembling that of guiacol, which may be given subcutaneously when mixed with proper vehicles.

Further details as to the best formula for subcutaneous employment are promised in a subsequent communication.

ACUTE INFLAMMATION OF THE MUCOUS MEMBRANE OF THE ILEUM FROM CLIMATIC CAUSES.

At the meeting of the Royal Medical and Chirurgical Society, held June 9, 1891, DRS. GEORGE THIN and FRANK J. WETHERED describe the case of a patient who was for many years known to them as a man of strong constitution and in the enjoyment of excellent health (*British Medical Journal*, June 13, 1891). While travelling in the north of China in the autumn he became, after a chill, subject to a moderate but obstinate diarrhœa. After several months, the tendency to diarrhœa increasing, he became subject to febrile attacks, and after three months of the combined moderate fever and diarrhœa he had lost forty pounds in weight, and was sent to Europe. The condition became aggravated on his way home, his journey being broken for six weeks on account of a very acute illness, of which the leading features were diarrhœa, retching, nausea, and fever, his condition for three weeks of that time being critical. After a comparatively rapid convalescence, during which time he regained his normal weight, he enjoyed three months of good health, and appeared perfectly well. A chill brought on another acute attack, the general symptoms of which were fever, nausea, abdominal uneasiness, thirst,

entire loss of appetite, and complete incapacity to digest food. During the whole of his illness there was diarrhœa, the intestinal discharge consisting of a dark-colored fluid with an apparent absence of any fæcal element. Death took place at the end of five weeks from the seizure. A necropsy was made by Dr. Sidney Martin. The mucous membrane of the ileum presented a worm-eaten appearance along its whole course. There were superficial ulcerations not extending deeper than the mucous membrane, and in some places there were discrete erosions of the size of a split pea. The ulceration increased as it descended the ileum, and the mucous membrane seemed somewhat thickened. At the entrance of the vermiform appendix into the cæcum the mucous membrane was thickened and slightly eroded. In the whole of the large intestine there were only about ten superficial ulcers, all of which were close to the cæcum, five being grouped together, this gut being otherwise healthy. The stomach and jejunum were unaffected, and there was nothing remarkable in the liver or spleen. Dr. Wethered prepared specimens of the viscera, and on microscopical examination the authors of the paper found the following morbid appearances in the ileum: No traces of the villi were observed. Lieberkühn's crypts in the least diseased parts were not affected at their deep ends, but were indistinct towards the free edge of the mucous membrane, and lost in a finely-granular substance which covered the whole of that part of the gut. At some parts, while the epithelium of the crypts could be recognized as much altered at their deep ends, atrophy and destruction had occurred at a short distance from their base, a mucoid-looking material distending the lower part of the crypt. In some parts the whole crypt was disintegrated, its position being indicated by the broken-down remnants of the epithelial cells. At the seat of the erosions the epithelium had entirely disappeared, the free surface being covered with a layer of granular material similar to that which covered the less affected parts of the gut, and below this substance there was a thick mass of small cell infiltration in the whole of the submucous layer. The muscular and subperitoneal coats were comparatively unaffected. The mucous membrane of the large intestine, as a whole, and all the upper parts of the intestinal canal, were normal. The authors had not been able to find any record of a case of acute inflammation of the mucous membrane of the intestine limited to the ileum and involving the whole of its surface. Clinically, it was shown in the paper in what respects the symptoms differed from typhoid fever and dysentery, the two diseases in regard to which questions of differential diagnosis could arise. Special attention was called to the apparent absence of fæcal elements in the intestinal discharge, and of the suspension of the digestive functions, notwithstanding that the stomach, duodenum, jejunum, and liver were comparatively healthy. Milk and raw egg, when not rejected by vomiting, passed in the motion entirely unaltered, and it was suggested that this suspension might at least partly have been due to a reflex effect from the inflamed mucous membrane of the ileum.

THE PROPHYLAXIS AND TREATMENT OF DIPHTHERIA.

At the meeting of the American Medical Association, Dr. J. Lewis Smith, of New York, read a paper on this subject before the Section on Diseases of Children, of which the following is an abstract (*Medical Record*, June 6, 1891):

The room should be disinfected by adding to one quart of simmering water one to two fluidounces of the following mixture:

℞ Oil of eucalyptus, ʒi;
Carbolic acid, ʒi;
Turpentine, q.s. ad. ʒvi.to ʒviii.

Everything and every person not absolutely necessary for the comfort and management of the patient should be excluded from the sick-room. Physicians undoubtedly conveyed the disease. They should always examine the fauces by standing behind or at the side of the patient, so that no ejected mucus may come upon them. After each visit they should wash thoroughly, in a sublimate solution, hands, face, and beard. Walking cases without fever, anorexia, or malaise diffused the disease. Daily inspection of the fauces of school-children had been proposed. Convalescents should not mingle with healthy children for four weeks. He admitted the full claim of the Klebs-Loeffler bacillus to be the cause of the disease. It was a surface microbe, never penetrating the interior of the body, but attacking only mucous surfaces or cutaneous abrasions. It produces a ptomaïne containing carbon, hydrogen, azote, sulphur, and oxygen, which by absorption through both blood- and lymph-channels causes the

nephritis-granulo-fatty degeneration of heart-muscle and paralysis.

The treatment should embrace hygiene, diet, and alcohol. Rectal alimentation could be followed for a time. Failure of appetite rendered the outcome doubtful. Diet could embrace milk ,with sarco-peptones, beef-tea or meat-juice, and the various predigested compounds. Large and frequent doses of alcohol were positively necessary. It is quickly eliminated, and often will save life unless blood-poisoning has actually set in. In the proportion of one to five it has been shown to have a destructive action on the growth of the bacillus.

Locally, we should remember that normal epithelium was a barrier to the germ's entrance, and hence our remedies should be such as not to destroy the epithelial covering. Denuded or diseased surfaces were favorable starting-points for the disease. Corrosive sublimate, 1 to 8000 ; carbolic acid, 1 to 50 ; salicylic acid, 1 to 80, had proven of service in arresting the germ growth. Potassic chlorate was useless in this direction, and he had come to discard its internal employment entirely. It had undoubtedly caused nephritis in many cases. The corrosive sublimate could be given by nasal injection, gargling, and internally. Where the false membrane was very thick and tenacious, equal parts of tincture of iron and glycerin should be given three or four times a day. Loeffler himself uses a mixture of carbolic acid, alcohol, and distilled water for the mouth. Our local remedies should be penetrating. Therefore glycerin and water, never syrups and mucilages, should be our vehicles for all local applications. The officinal solution of iron chloride might be diluted three or four times for this purpose. While it undoubtedly contracted the vessels it was often painful. It congeals the muco-pus of the fauces. Carbolic acid, Monsel's solution, and glycerin could be advantageously used in this way. For nasal disinfection a saturated solution of boric acid was preferable.

For internal treatment, iron assisted the anæmic condition. Vegetable tonics, including quinine, were probably useless, as were also quinine insufflations in the oral cavity. The main reliance was to be placed on the bichloride. He was in the habit of giving a two-year old child $\frac{1}{72}$ grain every two hours ; four years, $\frac{1}{40}$ grain ; six years, $\frac{1}{30}$ grain ; ten years, $\frac{1}{24}$ grain. His solution was made by dissolving the sublimate in alcohol and adding elixir of bismuth and pepsin. Sublimate solution, 2 grains to the pint, could be used for the nose. The mercurial should be continued at least, unless diarrhœa supervened, but not longer. Calomel had been suggested. Many gave an initial dose, and some continued it through the entire disease. It undoubtedly increased the anæmia. Of late it had been given in the New York Foundling Asylum by sublimation, from 10 to 40 grains being used, under a tent made over the patient's bed. The indications for its use was the supervention of hoarseness. The attendants had been salivated in several instances, but the patients were apparently not injured. It seemed to lessen the necessity for intubation. The process might be repeated in three or four hours. The percentage of recoveries from intubation, where necessary, was better in the calomel cases than in others. For the nephritis he gave iron, and for the paralysis tonics, strychnine, and electricity.

THE PHYSIOLOGICAL AND THERAPEUTIC ACTION OF CACTINA.

Cactina is claimed to be the proximate principle of cerium grandiflora, and has been isolated by MR. FREDERICK W. SULTAN, and forms the basis of a paper published by DR. O. M. MYERS in the *New York Medical Journal* for June 13, 1891.

Dr. Myers finds that locally, cactina is absolutely non-irritant, a ten per cent. solution applied to the conjunctiva producing no noticeable effect.

Therapeutic doses, in man and animals, produce an acceleration of the pulse and a rise in the arterial pressure.

Toxic doses, in animals, produce primarily an acceleration of the pulse-rate and a rise in the arterial pressure, but, secondarily, notably diminish both. The cardiac pulsations become arhythmical and finally cease, the heart being arrested in systole. The systoles, just before death, become very incomplete, probably due, as will be shown below, to a condition of superirritability of the cardiac ganglia. Death is preceded by tetanic and clonic convulsions, due to overstimulation of the motor side of the spinal cord. That the convulsions are not of cerebral origin is evident, as they occur after section of the cord in the upper cervical region. The motor nerves remain unaffected, for, after the death of the animal, galvanization produces contraction of the muscle. Cactina is therefore a powerful *motor spinal stimulant.*

In a dog, after section of the vagi, the

pulse-rate and arterial pressure were both increased by an injection of two centigrammes of the drug, and a strong faradic current, when applied to the nerve (vagus), failed to arrest the heart's action.

After section of the pneumogastrics and the sympathetics an intravenous injection of three centigrammes of cactina still maintained a decided rise in the arterial pressure and an acceleration of the pulse-rate. A fair conclusion, therefore, is that the drug produces these effects chiefly by *direct* stimulation of the intracardiac accelerator ganglion.

In the dog, after an intravenous injection of five milligrammes of cactina, the heart-rate was increased from 180 pulsations a minute to 222 a minute, and the cardiometer, indicating normally a height of 145 millimetres, showed an increase of the arterial pressure by a rise of 53 millimetres. If an animal is placed under the influence of cactina and the cardiometer applied, the blood-pressure, as before stated, will register about 198 millimetres. Now, if the spinal cord is cut high up, thereby intercepting the impulses from the medullary vaso-motor centre, the arterial pressure will instantly drop about twenty millimetres. This would indicate that the increased pressure was not wholly due to increased cardiac action, but a result of stimulation of the vaso-motor centre in the brain.

The following is the author's summary of the effects of cactina in therapeutic doses:

1. *Increases the musculo-motor energy* of the heart, probably through its influence upon the intracardiac motor and accelerator ganglia, in consequence of which the cardiac impulses become regular and much stronger.

2. Elevates the arterial tension, increasing correspondingly the height and force of the pulse wave. This is produced by—*a*, increased cardiac action; *b*, stimulation of the vaso-motor centre at the base of the brain.

3. Influences the nervous system by its direct action upon the motor centres of the spinal cord, thus increasing the reflexes and elevating the general nervous tone. Herein cactina resembles strychnine, and other points of similarity are evinced by clinical observation.

Therapeutics.—It logically follows, if conclusions as to its physiological action are correct, that in cactina we have a powerful cardiac tonic stimulant. Clinical observation teaches that its greatest value is manifest in functional disturbances of the heart, as simple dilatation and cardio-muscular atony (resulting from deficient innervation and nutrition) without organic lesions. If valvular disease exists, accompanied with dilatation, the drug would seem to be clearly indicated. In conditions of cardiac and general muscular relaxation with impaired nerve-energy, and in cases of "irritable heart," "tobacco heart," etc., the drug accomplishes excellent results; probably by (*a*) stimulation of the spinal motor-nerve centers; (*b*) constantly stimulating the heart-muscle to action and thereby increasing its nutrition and development.

A special indication for its use is during the critical periods of adynamic fevers, as it combines the elements of a heart and spinal motor stimulant.

Finally, it is stated in *Practice* for May, 1891, that, unlike digitalis, cactina may be administered continuously without fear of exciting gastric disturbance, and the objectionable cumulative action of the former drug is entirely wanting. In short, cactina may be employed with benefit in all varieties of functional cardiac and circulatory disturbances and in organic heart-disease, except in cases of *mitral stenosis*, where digitalis is to be preferred on account of its power of prolonging the diastolic period, thus affording the ventricle power and time to entirely empty itself. *Per contra*, in *aortic insufficiency*, the short diastole produced by cactina allows no time for regurgitation of blood into the ventricle; whereas, digitalis favors, by prolonging the diastolic period, just what we would seek to prevent.

CAFFEINE IN PNEUMONIA.

De Gempt (*Berlin. Klin. Woch.*) urges the use of caffeine in cases of threatened collapse in various asthenic diseases, but especially in acute pneumonia, and cites several cases in which it was successfully used in conjunction with stimulants. He believes the drug indicated in the course of acute pneumonia when there is evidence of cardiac failure, such as rapid, irregular pulse with lowered tension. Should the pneumonia be of asthenic type, it should be used from the onset, and the earlier in the course of the disease it is used after asthenia develops, the better. In cases of this sort, caffeine, in doses of .35 gramme four to five times daily, raises the arterial tension, diminishes the rate of the respiration and pulse, and lowers the temperature. Its action is prompt, but in urgent cases it had better be used hypodermically. It is advisable to continue it for a brief period after the febrile defervescence.—*Western Medical Reporter*, June, 1891.

THE ACTION OF THE INGREDIENTS OF ALOES.

It is well known that the juice of aloes is a mixture of a resinous matter, soluble in boiling water, and the substance aloin, which is, according to some, endowed with the active principle to a greater degree even than aloes, while according to others it is less active. This divergence of opinion is in great part explained by the fact that the different specimens of aloin extracted from different species of aloes are far from representing products which are at all comparable as regards their pharmacodynamics. It is evident, then, that we have here a question of pharmacology, which has, as yet, by no means been satisfactorily elucidated.

Dr. Hans Meyer has undertaken a series of researches in the Pharmacological Institute of Marbourg, with the end of contributing to our knowledge of the properties of aloins extracted from the three different varieties of aloes,—Barbadoes, Curaçoa, and Natal. His results are analyzed in the *Gazette Médicale de Paris* for May 23, 1891. According to Dr. Meyer, aloin, whether extracted from the Barbadoes, Curaçoa, or Natal aloes, is an active purgative when administered by the mouth or subcutaneously. The active dose is approximatively the same in the two cases, without doubt because in both cases the principal part of the aloes administered leaves the organism through the intestine. Even when aloin has been given subcutaneously, it is always to be found in considerable amount in the intestine, while but the merest traces of it are recognizable in the urine. When aloin is administered by the mouth, no trace of it can be found, as a rule, in the urine of man, in the dog, or in the cat. In the rabbit, on the other hand, aloin does not produce purgative effects, but develops a renal irritation, which may prove fatal even when by appropriate regimen the urine had previously been rendered alkaline. Eight to fifty hours elapse between the time when the aloin is administered and the production of purgation. It thus seems probable that the purgative effects are not produced directly by aloin, but by some derivative of aloin which originates in the intestine. Aloin is readily attacked by alkalies and metallic salts, and it consequently suggested itself to Dr. Meyer to study the action of aloin, after adding to it potassium carbonate and sulphate of iron. With the latter it appears that the purgative action of the aloin was somewhat increased. With the dog and the cat, the aloin extracted from Natal aloes, administered by the ordinary method, only produces purgative effect in very large doses, unless it is associated with alkalies, in which case it appears to possess the activity of the aloin of Barbadoes aloes. Natal aloes is inefficacious with or without the association of alkalies; to obtain purgative effects with this substance it is necessary that the subject should, for at least six days before the experiment, live exclusively on a meat diet. The resins of the different varieties of aloes, even although they contain extremely small quantities of aloin, have about the same degree of purgative power.

DEEP MEDICATION IN THE TREATMENT OF POSTERIOR URETHRAL CATARRH.

Dr. E. L. Keyes read a paper on this subject before the New York Academy of Medicine at its meeting held May 21, 1891 (*New York Medical Journal*, June 13, 1891.) Dr. R. W. Taylor, in a paper on this subject, after exhaustively reviewing the work of writers and comparing the opinions expressed upon the vexed question as to whether early radical removal of the initial lesion should or should not be resorted to, in the hope of limiting the specific action of the poison to its area of implantation, said he had now learned why efforts at radical treatment had hitherto failed. As the basis of a series of carefully-instituted observations, in which the microscopical work had been undertaken by Dr. Van Gieson, he had supplied, as specimens, portions of tissue taken from the neighborhood of various initial lesions of verified specific character, and of only a few days' development. The results of the investigations had gone to show conclusively, as would be demonstrated by the enlarged microscopic drawings which he exhibited, that, though the tissue around the chancre appeared perfectly normal, there was already widely-disseminated involvement of the subcutaneous structure. This consisted in changes in the circumvascular spaces by infiltration with small round cells, all the smaller arteries and veins over a considerable area beyond the initial lesion being thus involved. There was also in progress a process of abnormal proliferation of the endothelial cells of the vessels. From this it could be deduced beyond dispute that the infective processes were, from the period of implantation of the virus, of so rapid a character as to render utterly futile any attempts

at aborting the disease by cautery or excision of the initial lesion, however early it might be observed.

In the discussion which followed, DR. A. JACOBI said that it must be taken for granted that Dr. Taylor had adduced such evidence as proved his theory beyond argument. It was clear, then, that the secondary stage of syphilis began much sooner than was supposed. Accepting, then, the results of the investigations as scientifically correct,—and this they undoubtedly were,—the question of the early use of mercurials would seem of vital import. While he knew it was contrary to the practice of many others to begin the use of mercury in the initial stages, it had been his custom so to employ it, and with good results. Any doubts he might have had as to the propriety of this course would be now set at rest. He would like to know the author's views in this regard.

DR. TAYLOR said that, while as yet he had not given the point at issue consideration, he failed to see that the results of the investigation suggested deviation from his routine method of waiting until the constitutional developments had declared themselves before the institution of the indicated treatment.

THE PHYSIOLOGICAL ACTION OF CARBONMONOXIDE OF NICKEL.

In the *British Medical Journal* for June 13, 1891, PROFESSOR JOHN G. MCKENDRICK and MR. WILLIAM SNODGRASS, in a paper on the physiological action of carbonmonoxide of nickel, publish the following conclusions:

1. $Ni(CO)_4$ is a powerful poison when injected subcutaneously.

2. The vapor of $Ni(CO)_4$ in air, even to the extent of less than .5 per cent., is dangerous.

3. The symptoms are those of a respiratory poison, and are similar to those caused by carbonic oxide.

4. The spectrum of the blood of an animal poisoned by $Ni(CO)_4$ is that of carbonic oxide hæmoglobin, and it is not reduced by sulphide of ammonium.

5. When the substance is injected subcutaneously, it is probably in part dissociated in the tissues, as there is evidence of the existence of nickel in these tissues; but the nickel also finds its way into the blood and is found there.

6. The substance produces a remarkably prolonged fall of temperature even when given in small quantities. This may be accounted for by the hæmoglobin being prevented to a large extent from supplying the tissue with oxygen. Nico, as we may for convenience term this substance, makes it possible to give graduated doses of carbonic oxide, and thus reduce temperature by directly interfering with the respiratory exchanges occurring in the tissues. The objections to its use as an antipyretic are that, owing to its poisonous properties, it is difficult to inject it subcutaneously in sufficiently small doses, while it is not easy to obtain a solution in any menstruum in which decomposition will not take place. If a convenient method of dissolving it could be devised, $Ni(CO)_4$ might become a valuable antipyretic, the *modus operandi* of which is intelligible. We are at present experimenting in this direction.

The authors intend to continue the investigation, more especially as to (*a*) the solubility of the substance, (*b*) the quantitative effects on the gases of the blood, and (*c*) the quantitative effects on the gases of the air breathed by an animal under its influence.

DRAINAGE IN ABDOMINAL SURGERY.

DR. D. P. ALLEN, of Cleveland, in a paper with the above title read before the Section in General Surgery of the New York Academy of Medicine, considered the subject under three heads (*New York Medical Journal*, June 13, 1891).

Posterior urethritis, he said, had now become very generally recognized by specialists and its management much simplified. Still, among the profession at large there existed much ignorance and misconception on the subject. As a matter of fact, the treatment was easy and did not call for expert skill in the use of instruments. The author then elaborated carefully the salient points in the various conditions of the male urethra likely to give rise to intractable discharges, especially those morbid secretions having their origin in lesions situated in the posterior urethra, taking the ground that these latter were constantly overlooked by even the best men, and that patients suffering therefrom would wander from physician to physician without the true cause of their trouble being recognized, or at any rate without proper treatment for their condition being instituted.

Dr. Keyes detected posterior urethritis as follows: He "milked" the urethra, by press-

ure, firmly with the finger from the perineum forward and then caused the patient to urinate into two separate conical glasses. If there was posterior urethritis of mild grade, the first urinary gush would contain free pus in a quantity disproportionately great when compared with what had been milked out at the meatus by digital pressure. If the grade of posterior urethritis was high, the second urinary flow would also contain free pus. If the latter had come from a prostatic abscess or a suppurating seminal vesicle, this might be demonstrated by making the patient urinate in three parts,—one to wash the prostatic sinus, a second gush to show relatively what proportion of pus had flowed backward into the bladder, and here milking the prostate or the suspected vesicle by a finger in the rectum; then a third urinary gush to show what, if any, excess of pus or prostatic or seminal matter had been added to the urine by the rectal manipulation, a point to be settled by the microscope. Sources of pus from the bladder or from the kidney were omitted from consideration in the paper.

For the treatment of the condition there were certain substances which might be injected into the deep urethra when once the disease was recognized, which would have a direct local effect without subjecting the patient to the danger of cystitis or to any of the consequences of ordinary injections or the use of sounds, and would save him from the necessities of treatment by the knife. The instrument used by the speaker was the Keyes syringe, and with it twenty minims could be thrown in so that the injection would flow through the prostate and into the bladder without any of the fluid returning. He was in the habit of using four substances,—sulphate of thalline, glycerole of tannin, sulphate of copper, and nitrate of silver. The thalline was bland and unirritating. He made use of a solution of three to twelve per cent. in water. Of the sulphate of copper he used a ten per cent. solution in glycerin. The glycerole of tannin was too thick to use pure, and required from twenty-five to seventy-five parts of water to thin it. The nitrate of silver he used in a ten per cent. solution, though rarely employing it, especially in catarrhal cases. By the use of these four solutions the speaker emphatically stated that the greatest advantage might be obtained in cases which were properly diagnosticated as posterior urethritis. Without these remedies he should be tempted to give up the treatment of this affection, and, when they failed, he believed the mistake in diagnosis was obvious.

The speakers who discussed Dr. Keyes's paper in the main approved his methods of diagnosticating the location of the morbid process, differing with him only as to the therapeutical agents and instruments according to individual experience.

THE ACTION OF SULPHUROUS ACID ON THE ECONOMY.

The importance of a knowledge of the effects of sulphurous acid on the human organism has been of late very much increased by the frequency with which this agent is now employed for the preservation of wine and vegetables. It is known that after animals have been poisoned by breathing air impregnated with sulphurous acid, the highly irritating properties of the gas are manifested by the injected state of the blood-vessels of the mucous membrane of the respiratory tract where the sulphurous acid has come in contact with it, the blood of the viscera being found dark and coagulated. Also that animals that are not killed recover very rapidly, but after a few days show signs of bronchitis and pneumonia, and die. The subject has recently been examined by DR. L. PFEIFFER, who in some experiments employed sulphurous acid in the form of neutral sulphite of sodium, and not in the free state, so as to avoid the caustic action. He found that both warm- and cold-blooded animals recovered very rapidly from an almost moribund condition, which showed that there must be either very rapid elimination or a chemical change into some harmless substance. Experiments instituted with the object of elucidating this point showed that 96.5 per cent. of the sulphite was eliminated by the kidneys as sulphate, the remaining 3.5 per cent. only as sulphite. When a large quantity of sulphite had been administered, it was nearly all eliminated in five hours. Dr. Pfeiffer believes that when vegetable-feeders are made to breathe air containing free sulphurous acid for some considerable time a reduction of the alkalinity of the blood is induced. In animals breathing air containing from one to three parts of sulphurous acid per thousand intense inflammation of the tracheal and bronchial mucous membrane was produced, also inflammatory foci in the tissue of the lungs, the blood in the capillaries becoming black and coagulated. Injections of a 5 per cent. solution of sulphur-

ous acid into the stomach set up very extensive and severe gastritis, not only all the coats of the stomach itself being affected, but also the superficial portions of neighboring organs, as the liver and the diaphragm, death occurring in from three to five minutes. It is suggested that this rapid and far-reaching action may be due to the disengagement of the gas by the heat of the stomach, so that it diffuses itself much more rapidly than a liquid could do. Dr. Pfeiffer finds that in some wines there is as much as eight parts of sulphurous acid, probably as bisulphide of lime, in 100,000, and that in preserved vegetables, such as are used in the army and on board ship, there is often a very appreciable quantity either free or combined with alkalies, this being especially the case with preserved asparagus.—*Lancet*, June 13, 1891.

THE CHEMISTRY AND CLINICAL VALUE OF STERILIZED MILK.

Of late years a great deal has been written upon the dangers of transmission of infection by means of milk derived from diseased animals, or improperly handled or exposed, and, as a consequence, sterilization has been regarded as a necessity; but the milk, after sterilization, has been found to be so changed in that process that of late a reaction has set in, and the question has arisen whether or not the desired immunity could not be better attained by some other means. In the *American Journal of the Medical Sciences* for June, 1891, Professor A. R. Leeds and Dr. E. P. Davis contribute a valuable paper as to the nature of the changes effected in milk by sterilization and the clinical value of sterilized milk.

Professor Leeds is well known as an authority on the subject of milk analysis, and his conclusions are extremely interesting and valuable. Dr. Leeds finds that raising the temperature to the boiling-point, and still more the retaining of it at that point for a lengthened period, as in sterilization, converts a considerable portion of the soluble into insoluble proteids. The effect of heat is greatest on the galactozymase,—the ferment found in raw milk, which has the power of liquefying starch; even raising milk for a moment to the boiling-point destroys this ferment action. Experiments made to contrast the behavior of sterilized milk with raw milk, when subjected to the action of rennet, acid, artificial gastric juice, and pancreatic juice, show that the casein, while not coagulated by the heat, is, nevertheless, less readily coagulated by rennet, and yields slowly to the action of pepsin and pancreatin. Moreover, a part of the lactalbumen of the milk is coagulated, although only partially so. Its effect, however, is to thicken the milk and intensify its colloidal (ropy or mucilaginous) character. The fat globules are likewise somewhat affected by the heat, and the coagulated proteid matters attach themselves to the fat globules, and probably have an influence in bringing about the difficulty with which the fat is assimilated.

Finally, milk-sugar, Dr. Leeds finds, is completely destroyed by long-continued heating, and is probably affected to a certain extent during the interval ordinarily allowed for sterilization. Dr. Leeds thus shows that sterilized milk is less readily and less perfectly digestible than raw milk, and if sterile milk is sought for, the present desideratum is to obtain it either directly from the animal or by a process not accompanied by such serious drawbacks.

Dr. Davis confirms the opinion, which has gradually gained ground, that while sterilized milk may be useful as a remedy in various bowel complaints, it is not sufficient to sustain life. If sterilized milk is desired, Dr. Leeds recommends that, after being rendered feebly alkaline with lime-water, the milk should be heated to 155° F. for six minutes; or, still better, the treatment, in alkaline solution, with pancreatin at 155°, followed, if not immediately used, by momentary heating to the boiling-point. Either of these procedures, Dr. Leeds maintains, will render milk sterile without detracting from its digestibility.

PROTEIDS OF MILK.

In the *British Medical Journal* for May 23, 1891, Dr. W. R. Halliburton publishes his conclusions in regard to the proteids of milk, as follows:

1. The principal proteid in milk, called "caseinogen," is precipitable by certain neutral salts, or by acetic acid, and may be most satisfactorily prepared free from impurities by a combination of these two methods.

2. The term "casein" should be restricted to the curd formed from caseinogen by the action of rennet.

3. In the classification of proteids, casein

should be grouped with other insoluble proteids like fibrin and gluten, formed by ferment activity from pre-existing more soluble proteids.

4. Caseinogen should be included in a new group made to include it and whey proteid. These proteids are very similar to the globulins, the chief difference being that their solutions are not coagulated by heat like the globulins, but only rendered opalescent. This opalescence, if the heating has not been continued too long, disappears on cooling.

5. Lactalbumen is very similar in its properties to serum albumen. Not only does it differ, however, from serum albumen in its specific rotatory power and elementary composition, as has previously been shown, but in its behavior on heat coagulation and in precipitability by certain neutral salts.

6. Caseinogen and lactalbumen are the only proteids contained in milk.

7. The proteid described as lactoglobulin does not exist; it is owing to the error of not recognizing that the two salts,—sodium chloride and magnesium sulphate,—when both present to saturation, precipitate albumen, that this proteid has been supposed to exist.

8. The proteids variously called lactoprotein, peptone, and hemi-albumose do not exist in milk. This mistake has arisen from faulty methods of analysis.

9. When milk turns sour, owing to the lactic acid fermentation, primary proteoses, chiefly protoproteose, are developed.

10. The proteid called whey proteid, which is formed during the rennet fermentation, is not of the peptone or proteose class, but should be included with caseinogen in a new class of proteids allied to the globulins.

RELATION OF THE PANCREAS TO GLYCOSURIA AND ALBUMINURIA.

At the meeting of the Académie des Sciences, held May 4, 1891, DR. HEDON read a paper which largely tended to confirm the conclusions of Lépine, already published in previous numbers of the GAZETTE (*Le Progrès Médical*, May 16, 1891).

Dr. Hedon found that glycosuria invariably appeared after extirpation of the pancreas, and, although it ultimately proved fatal, it might yet, during periods of variable lengths, cease entirely. When this was the case it was then found that albuminuria was present. Similar effects also were observed when sclerosis of the pancreas was produced by means of injection into its canals of paraffin. Also diabetes insipidus might alternate with the progress of diabetes mellitus. When the progress of the disease was slow, during the periods when glycosuria was absent after extirpation of the pancreas, it was then found that sugar given with the food was completely utilized and absorbed, thus suggesting the fact that the function of the pancreas may be supplemented by some other organs.

TREATMENT OF WHOOPING-COUGH BY ATOMIZATION.

In the *Medical Record* for June 13, 1891, DR. H. ERNEST SCHMID states that in the treatment of whooping-cough, no matter what may be the stage of the disease, he now relies entirely upon the use of a spray of a solution of carbolic acid, menthol, cocaine, glycerin, and cherry-laurel water in the following proportion:

℞ Acid. carbolic., grs. vi;
Menthol, four per cent. solution, ʒiv;
Cocaine, three per cent. solution, ʒiii;
Glycerin, ʒi;
Aquæ lauro-cerasi, ad ʒi.

He directs that this solution be thoroughly used by an atomizer every three hours, employing force, if necessary, and disregarding any apparent strangling upon the part of the little one during vigorous atomization. The nozzle of the instrument should be directed as far into the mouth of the patient as possible. During the struggling and sputtering and strangling some deep respirations will before long be made, and the object is accomplished. At first, of course, in most cases a violent paroxysm of coughing may result from the spraying, especially if much force has to be used with the child, but these soon cease and palpable effects are speedily noticed by the parents. The great point is to be able to impress the importance of perseverance. Dr. Schmid writes that he has seen the whooping-cough arrested by this means after one thorough spraying, coughing without the whoop still going on for a while, and perfect recovery has resulted in one and two weeks. He records several cases in detail which seem to substantiate his claims that this method is one of the most efficient yet devised, provided it be used intelligently and, if necessary, energetically.

REINFECTION OF SYPHILIS.

The important, interesting, and still open question of a second infection with syphilis is made prominent at this time by Dr. Taylor's report of two cases in the *Journal of Cutaneous and Genito-Urinary Diseases* of December, 1890, and in the same journal for June, 1891, there is an analysis of several additional cases. LABARSKI reports a case in the *Medicin. Rundschau*, 1890, of a soldier who in 1878 presented himself with a chancre which had appeared three weeks before. Secondary symptoms appeared, and a course of forty inunctions was made. The following year there were later manifestations, which, like those, disappeared under treatment. In 1880 there were tertiary lesions, and then came a period of eight years of entire freedom from symptoms. In December, 1888, a soft chancre appeared upon the penis a few days after exposure, and was followed by a suppurating bubo. This chancroid appeared to pass into an initial lesion of syphilis. In March 1889 (three months later), there was a roseola, accompanied by angina, enlargement of the glands, etc. Treatment was carried out by means of injections of corrosive sublimate, gm. 2, in oil of vaseline, gm. 60, of which a syringeful was injected once a week. (This case does not appear conclusive, for we know that in a syphilitic subject induration and incidental lesion, such as a chancroid causing it to resemble a primary sore, and a roseola and angina resembling that of secondary syphilis may appear from other causes.)

The case which Harrison Young reports, on the other hand, in the *British Medical Journal*, No. 22, November, 1889, possesses more of the requisite features to make out a strong case. Here, after an infection in 1882, with symptoms showing themselves up to 1885 and an interval of four years of freedom, a new hard chancre was contracted in 1889, accompanied by indolent adenopathy and followed by roseola, mucous patches, etc.

Ducrey's case, reported in the *Giornale Italiano delle Malattie Ven. e della Pelle*, December, 1886, concerned a woman who gave a good history of syphilis, with characteristic secondary manifestations, adenopathy, etc. After marriage patient remained well for ten years. Then the husband contracted a chancre and infected his wife. When examined she was found to have a cicatricial induration of one of the labia, general glandular enlargement, a macular syphilide over the whole body, mucous patches on the soft palate and velum, and complained of rheumatic pains. At the same time there was such evidence of her former infection as a characteristic gumma of the scalp and multiple cicatrices of an old tuberculo-ulcerative syphilide, and atrophic scars from more recent dry tubercles. Other secondary manifestations of the reinfection followed; the body became covered with a small pustular syphilide, osteocopic pains became very severe, and an iritis developed, together with ulceration of mucous patches, etc.

This case seems to fulfil the conditions regarded by Fournier as necessary to establish reinfection,—*i.e.*, characteristic secondary signs (initial lesion not noted in this case, though the late lesions seem to prove the first infection), a period of entire freedom from manifestations, a new indurated sore after coitus with a recently-infected husband showing secondary signs, and a renewal of secondary accidents.

Pospeloff (*Rev. de Cien. Med. de Barcelona*, 1890) relates the case of a patient who acquired a chancre two weeks after coitus in October, 1882. The nature of the ulcer was agreed upon by four physicians. In January there was fever and a roseola. Mercurial frictions were made. Mucous patches of the throat and lips then appeared and local treatment was instituted. In March, 1883, all signs of syphilis disappeared after mercurial friction, but in May psoriasis palmaris was noted. At the end of October (one year after infection) inguinal adenopathy alone was noted. In 1884 treatment was continued and no signs of syphilis were seen. In 1886 patient married, and the event was followed by the birth of a healthy child. In December of 1889, four weeks after impure coitus, there appeared at the root of the penis and extending upon the pubis two lesions, which Pospeloff saw in the following February and diagnosticated as true chancres. Six weeks later there appeared roseola, inguinal and cubital adenopathy, erythematous angina, and patches on the tonsils. The roseola disappeared after two months. Contrary to the views of Ricord and Sigmund, the second infection was more intense than the first. Two months after the roseola had disappeared there was some induration remaining at the site of the chancre; lenticular papules were disseminated over the internal surface of the forearms and thorax, and there were erosive papules on the lips. The observer considers these signs of syphilis in its second stage conclusive evidence of a reinfection, v

occurrence proves the cure of the first attack.

Dr. Clatworthy relates of syphilis recurring within three years of a first attack (*Australian Med. Gaz.*, February, 1891). The first chancre appeared in January, 1888, leaving a scar and being followed by secondary symptoms, enlarged glands, mucous patches, and alopecia, but no eruption. Rheumatic pains lasted for a year. Mercury and iodide were taken for two years. In November, 1890, patient was again exposed, and in December a circular chancre was found near the site of the first, indurated and ulcerated; no accompanying glandular enlargements. A few days after the chancre had disappeared a well-marked macular eruption came out over the chest, buttocks, and thighs, and this was followed by bone pains and sore throat. The first attack was not personally observed by the reporter, and some elements of a strong case are lacking.

INTRABRONCHIAL INJECTIONS IN PULMONARY PHTHISIS.

Dr. Giulio Masini has made experiments (*Gazetta degli Ospitali*, January 7, 1891) as to the possibility of injecting medicinal substances directly into the bronchi, and has satisfied himself that it can be done. He uses for the purpose the barrel of an ordinary syringe, to the distal end of which is fixed a catheter, with the usual laryngeal curve, which can be pushed out or drawn in as may be required. The liquid used was a twenty per cent. solution of olive oil, filtered and sterilized, and creosote. This is injected into the trachea or into one or other bronchus by passing the catheter through the glottis from the mouth. Auscultation by an assistant, while the liquid is being injected, enables the operator to know whether the medicament is reaching its destination. The experiments were made in Professor Maragliano's clinic, at Genoa, on five men and one woman suffering from various degrees of pulmonary disease,—from catarrhal bronchitis with doubtful signs of tuberculosis to the gravest form of phthisis, with infiltration of both lungs, cavities, etc. In two of the cases in which on admission there were signs of disease at the apex, with night-sweats and wasting, the effect of the treatment was very remarkable. After injections of the solution every day for a month (increasing gradually in amount from one to four cubic centimetres) the physical signs disappeared "completely" in one case, and "all but completely" in the other. Both of them gained considerably in weight. In one of the remaining cases the treatment had to be discontinued almost immediately, on account of the extreme sensibility of the larynx and the indocility of the patient. In the three others, daily injections (of four, five, eight, up to ten cubic centimetres) were given during three months and a half; in two of them "a notable result" was obtained, the expectoration ceasing almost entirely, the diseased area in the lungs becoming much smaller and the patients gaining weight and feeling better. In the fourth case the disease remained stationary, but the daily amount of expectoration diminished by eighty grammes, and there was a slight gain in weight. Dr. Masini thinks these results sufficiently encouraging to warrant further trial of the method.—*Chicago Medical Recorder*, May, 1891.

THE EARLY DIAGNOSIS OF DISEASES OF THE SPINE IN CHILDREN.

It is a simple matter on paper, but not always so in actual practice, to say whether a child has or has not early vertebral ostitis. Those who have seen most of spinal disease in children will be the least likely to dispute this statement. In a doubtful case the child should at once be placed flat in bed, and kept flat until all equivocal symptoms have passed off. Many instances have occurred in which the practitioner, though suspecting the invasion of ostitis, has allowed the child to run about, because the existing symptoms were not sufficiently obvious to enable him to form a positive diagnosis. There are two methods of examining for spinal caries, which are as widely adopted as they are antiquated and unsatisfactory. The first is that of pressing upon the spinous processes from the nape of the neck downward. The disease being in the body of the vertebræ, pressure upon the tip of the spinous process is hardly likely to give trustworthy information. Often, indeed, there may be neither pain nor tenderness in the affected region. The second method is that of applying a hot sponge along the spine. Any child would be apt to wince under this test, even though its spine were healthy. On the other hand, if its spine did happen to be diseased it would by no means follow that the hot sponge would give information of that fact.

Though there is often no local pain with

spinal ostitis, there are often complaints of symmetrical peripheral pains, which are too frequently ascribed to "rheumatism" by those who do not trouble to seek out their cause.

In an interesting lecture on this subject, published in *The Medical Press and Circular* for May 27, 1891, MR. EDWARD OWEN calls attention to the fact that before proceeding to examine the child, it is well to question the parents as to the complaints of aches or pains, and to notice how the child holds himself. Probably he will be standing unusually straight, with his head and shoulders somewhat thrown back in order to keep himself in a position of stable equilibrium, the centre of gravity having been advanced by the collapse of the softened vertebræ. As regards pain, it may probably have been complained of in the back. But very possibly there may have been no complaint of that nature, the child having suffered only from peripheral neuralgias. These distant pains are usually symmetrical, and it is strange how the very terminal filaments of the sensory nerves are those chiefly concerned in it. Thus, in cervical caries there may be pains in each side of the neck; or, the third and fourth nerves being implicated, over the pectoral regions and shoulders. The lecturer then brought in a child, directing attention to its stiff and straight pose, and to the fact that it supported itself by holding on by his mother's dress. On being questioned, the mother said that the child's constant complaint was of "headache in the chest." Intercostal pains, which were carelessly ascribed to "pleurodynia"—whatever that was—or to "rheumatism," were often the result of vertebral disease. So also with "belly-aches," pains in the hips, thighs, legs, and feet; in the arms, elbows, and hands.

Several naked children with various spinal affections were then brought in. Attention was called to the fact that straightness of the spine in the cervical and lumbar region was as characteristic of vertebral caries as was the angular projection which so quickly appears in the case of caries of the dorsal vertebræ.

After all, stiffness was the most important sign of early spinal disease. Two boys of about the same age were placed side by side upon the floor; one of them had dorsi-lumbar disease, while the other had a sound spine. The latter could put his head between his knees, his back assuming a beautiful, convex sweep. The other boy could not bend down at all. Two children were then brought in whose projecting spinous processes offered strong suggestion of vertebral caries. Their backbones could, however, be freely bent and turned in every direction, and were manifestly destitute of inflammatory trouble. Their mothers said, moreover, that they had not complained of pains, and that they could run about and play with other children without showing unusual fatigue.

As regarded the treatment of the early stages of spinal disease, Mr. Owen summed up his advice in one word, REST—absolute and continuous rest. The child should be placed on a narrow horse-hair mattress, with the head securely steadied between very large sand-bags, only a small, flat cushion or pillow being allowed beneath the nape of the neck. When the pains had become a matter of almost "ancient history;" when it was certain that no abscess was forming, and when, with the lapse of many months, it might be considered that all tubercular inflammation—and these cases are always tubercular—had passed away, some kind of rigid support might be employed. To substitute a plaster of Paris or a poro-plastic splint, however, for absolute rest in the horizontal posture was one of the commonest errors of the present time in connection with the treatment of early spinal disease.

THE ACTION OF THE BLOOD SERUM OF THE DOG ON THE CORPUSCULAR ELEMENTS OF HUMAN BLOOD.

It is well known that transfusion of the blood from one species of animals into another is followed by disorganization of the corpuscular elements with the production of thrombosis and hæmoglobinuria. Such a result is usually attributed to the solution of the corpuscles of the transfused blood. In view of the recommendations which have lately appeared in the French medical press as to the transfusion of the serum of the blood of the dog and the goat into individuals affected with tuberculosis, it naturally becomes an important question to decide whether a similar noxious influence is exerted by the blood serum, and in this connection we would call attention to a paper published in *La France Médicale*, May 29, 1891 by DR. CHARLES LUZET. It is well known that the effects of transfusion vary with the nature of the species experimented on, and with the quantity of the blood injected. It is further of interest to determine as to

whether subcutaneous injections of blood serum which do not directly come into contact with the corpuscular elements can also exert a hurtful action.

Dr. Luzet's experiments were made by mixing a drop of serum and a drop of blood on the warm stage under a microscope. His first experiment consisted in mixing a little blood of a perfectly healthy individual with the serum of a dog. Immediately on examining under the microscope it was found that the red corpuscles ran together in an irregular mass instead of ranging themselves in rouleaux, as would be naturally expected. A certain number of the red corpuscles, however, remained isolated, and on them the morphological changes produced by the blood serum could be readily followed. Almost immediately these corpuscles were found to assume the crenated form, after about three minutes an exudation appeared on the edges of these corpuscles, and after five minutes epinated corpuscles were visible and exudation had largely increased; after five minutes no reticulum was visible, while at about the seventeenth minute the reticulum commenced to be evident in an extremely fine, open, net-work visible only at the border of the corpuscular mass, this fibrinous net-work being much more than normally the case. During all this time the white corpuscles had observed their amœboid activity, while at about the twentieth minute the nuclei of the white corpuscles became evident; finally the viscidity of the corpuscles was found to be greatly increased.

In his second experiment the blood of a second healthy individual was mixed with blood serum of a dog, and here also the same morphological changes in the red corpuscles was evident and the same delay and imperfection in coagulation. His third experiment consisted in mixing the blood of a dog with blood serum under the same conditions. Here also the red corpuscles ran together to form a compact mass, and about the same general results were obtained, with the exception that the interference with coagulation was more marked and that the viscidity of the red corpuscles was much more accentuated than when the serum of the dog was allowed to act on human blood. It thus would seem from these experiments, which were confirmed by numerous others, that serum acts upon the formed elements of the blood by precipitating the hæmatoblasts and in preventing or interfering with coagulation. If the serum of a dog is allowed to act on the blood of man or the serum of human blood upon the blood of a dog, the marked corpuscular alterations which occur and the solid blood concretion point in the strongest terms to the theoretical possibility of the formation of emboli by such procedures. As it appears that these transfusions of serum have been practised to a considerable extent in France, it is remarkable that as yet we have met with no accounts of serious emboli so produced.

THE PHYSIOLOGICAL ACTION OF THE ETHEREAL EXTRACT OF MALE FERN.

The rhizome of the male fern (*Aspidium filix mas*) treated by ether in a displacement apparatus yields a brownish oleo-resin which has for a long time been employed as a vermifuge. This oleo-resin is a mixture in which filicic acid, filiceic acid, filixoide acid, filictannic acid, and filicine have been recognized. Filicic acid has been especially studied in Dorpat under the direction of Buch. While Leibig denies the tænicide properties of this acid, Carlblom claims that in this principle is found the active ingredient of the ethereal extract of male fern. Rulle, on the other hand, states that impure filicic acid or the products of the decomposition of this acid is the most efficacious. The general testimony, however, points to the conclusion that the action of this principle is less constant than that of the oleo-resin. It is well known that the fern exercises an energetic toxic action upon inferior organisms, particularly upon worms, but the nature of this action and that which it may exert upon higher organisms has not yet been satisfactorily studied. It is generally believed that in man the male fern is almost non-toxic, and extremely large doses are courageously given as a vermifuge. Nevertheless, some cases of poisoning have been reported in which phenomena of gastro-intestinal disturbance, vomiting, diarrhœa, and nervous phenomena have been reported. Thus, in a case reported in the *Medical Times and Gazette* for 1882, ingestion of the ethereal extract of male fern and pure kamala produced death at the end of one day, with the production of vomiting, diarrhœa, and muscular cramp. The ethereal extract of male fern from which the ether has been removed occurs in the form of a semifluid soluble substance soluble in ether, insoluble in water, and of a peculiar nauseating odor. In the *Revue Médicale de la Suisse Romande* for May 20, 1891, Drs. J.

PREVOST and PAUL BINET publish a series of experiments which they have made with this substance, the extract being administered in the form of an emulsion with the aid of gum-arabic, of which the followng represent their conclusions:

1. In warm-blooded animals and in man administration by the stomach rarely produces phenomena of poisoning on account of the extreme slowness of absorption.

2. As a consequence of hypodermic or, above all, of intraperitoneal injections of emulsions of the male fern, symptoms may be produced which may lead to death by paralysis of the heart and respiration.

3. The dominant symptom is paralysis and rigidity of different muscles, the several muscles of the heart, and the intestine, preceded by general symptoms, such as vomiting, dyspnœa, trembling, and chills. The affection of the respiratory muscles leads to the production of interference of respiration, which may prove so serious as to produce death. Paralysis of the heart, however, where the poisoning is sufficiently severe to proye fatal, is usually the cause of death. In such cases, when examined post mortem, the heart is found firmly contracted and non-irritable. The pneumogastric nerve, however, does not lose its power of stopping the heart until the final stage in poisoning. The intestinal peristaltic movements are almost entirely suppressed in the rabbit, cat, guinea-pig, and the pigeon. The direct application of the extract to the conjunctival sac of the rabbit or cat reduces and may even entirely suppress sensibility of the cornea without any constant modification in the size of the pupil, this action thus closely resembling the action of cocaine. No other reduction of sensibility has, however, been noted as the result of application of this substance in other regions than the cornea.

4. The urine is usually reduced in amount after the administration of the extract.

5. The central nervous system, which is only secondarily affected in warm-blooded animals, is rapidly paralyzed in the frog, in whom paralysis of the spinal cord and then of the nerve trunks complicate the phenomena of rigidity and loss of power of the muscles.

6. Leeches immersed in a gum-arabic-solution emulsion of the extract of male fern also present phenomena of paralysis and rigidity.

7. The oxidizing action of protoplasm on the tincture of guiac is prevented by the addition of the extract of male fern.

CANTHARIDIN IN TUBERCULOSIS.

DR. FORLANINI, of Turin (*Gazetta Med. Lombarda*, May 9, 1891) (*British Med. Journal*, May 30, 1891), has tried Liebreich's treatment of tuberculosis by cantharidinate of potassium in five cases (three of phthisis, one of pleurisy,—probably tuberculous,—and one of croupous pneumonia. In two cases the treatment had produced no appreciable results up to the date of report. Of the remaining three, in one (a woman suffering from phthisis) the injection of 2 decimilligrammes caused general and local reaction, the development of a new zone of dulness, and increase of *râles*. In a second (tuberculous pleurisy) the patient had already been treated with tuberculin without result. After the first injection of 2 decimilligrammes of cantharidinate of potassium general and local reaction occurred; the temperature rose, and reaccumulation of effusion, which some days before had been removed by thoracocentesis, took place. After the subsequent injections the fever subsided and the effusion greatly diminished. In the third case (croupous pneumonia extremely slow in resolution) crisis had occurred eight days previously; the injections were followed by a moderate degree of fever, decrease in the area of dulness, and abundant crepitus redux. Forlanini concludes that, contrary to Liebreich's statement, injections of cantharidin are followed by a certain amount of both general and local reaction analogous to that which follows the use of tuberculin. In all three cases the injections caused slight albuminuria and urobilinuria.

DR. ERNEST GERMONIG, of Trieste, reports (*Lo Sperimentale*, May 15, 1891) the results of the cantharidin treatment in ten cases. In eight of these the patients were suffering from pulmonary and laryngeal tuberculosis, in one from lupus and pulmonary tuberculosis, and in one from "chronic hypertrophic laryngitis." In all these cases, with one exception, bacilli were found in the sputum. All the patients complained of intense pain at the time of injection; in some cases this lasted for one or two days. In a few instances cantharidinate of sodium, recommended by Lublinski as being less painful than Liebreich's original preparation, was employed. The injections, as a rule, were given on two successive days, the dose being 1 decimilligramme on the first occasion and 2 on the second. In two cases the injections were given on five successive days, beginning with $\frac{1}{50}$ of a milligramme, and rising grad-

ally to 1 decimilligramme. No reaction was observed at the site of injection. In six cases some urinary trouble (strangury, traces of blood in the urine, and in three instances albuminuria without casts) was caused by the treatment. These symptoms lasted from two hours to a couple of days. A few drops of tincture of opium relieved the straining and smarting during micturition. The largest number of injections in any one case was eighteen, the least two, excluding one case in which a trace of albumen appeared after the first injection. In all the cases except two the laryngeal lesions were slight, and considerable improvement was observed in voice and deglutition, and also in the laryngoscopic appearances. In the other two cases fever was present before treatment was begun. The injections seemed to have no particular effect on the fever, nor did it produce any amelioration of the pulmonary symptoms, excepting that on the days of injection the expectoration was more abundant and more mucous in character. In one of them (a man, aged 32, with dulness and fine crepitation at one apex, "enormous" thickening of the epiglottis, and redness, swelling, and ulceration of the arytenoid cartilages) after three injections swallowing was so much easier that solid food could be taken, the voice was less hoarse, and the epiglottis was so much reduced in size that the interior of the larynx could be seen; after eighteen injections it was smaller by one-third, and an ulcer on its upper surface as well as one on the left arytenoid cartilage had healed after two applications of lactic acid; the redness and swelling had almost disappeared, and the voice was comparatively clear. There was no improvement, however, in the condition of the lung, the fever persisted and the patient had slightly lost weight, and thought he was becoming weaker. In the other case (a woman, aged 20, suffering from "hypertrophic laryngitis") the voice had been lost for six months, and there was marked thickening and redness of the vocal cords, which presented warty excrescences in the vicinity of the vocal processes. After ten injections the voice became perfectly clear, and the thickening and redness of the cords, together with the warty excrescences, had disappeared. From this experience Germonig draws the following conclusions: (1) Cantharidin is harmless and can be used even in out-patients if a watch can be kept on the urine and the dose of 2 decimilligrammes is never exceeded. (2) Doses of 1 decimilligramme do not cause albuminuria or other urinary trouble. (3) Doses of 1 decimilligramme are sufficient to produce satisfactory results if administered two days successively. (4) After injections have been given on two successive days an interval of at least one day should be allowed before another injection is given. (5) In cases of simple inflammation and tuberculous infiltration of the larynx cantharidin causes an exudation of serum which is quickly reabsorbed, with the result that the infiltration is diminished, the voice becomes less hoarse, and swallowing is less difficult. (6) Under the treatment tuberculous ulcers show a tendency to heal. (7) The remedy can take the place of curetting, which is less easy of performance and more painful to the patient. (8) No other remedy produces so rapid a diminution of tuberculous infiltration of the larynx. (9) The cantharidin treatment may be advantageously combined with the application of lactic acid. (10) It has no effect on the tuberculous process in the lungs; it neither sets up nor reduces fever, and it has no effect on the number, shape, or color of the bacilli. (11) It is contraindicated in cases where albuminuria is present. In the case of lupus the treatment produced no effect whatever. With one exception no rise of temperature or other sign of general reaction followed the injection.

HEADACHES IN CHILDHOOD.

JULES SIMON (*Gaz. des Hôp.*, Nos. 36 and 37; *Rev. des Mal. de l'Enf.*, May, 1891) recognizes seven different groups of headaches:

1. *The Headaches of Growth.*—They are frontal, exaggerated by work, coincident with pains of the joints, periosteum and cardiac hypertrophy. Treatment: Muscular rest, tonics, good food, phosphate of lime, beer, and malt.

2. *Headaches from Mental Strain.*—The children are either very intelligent and excitable, working very hard; or, on the contrary, they are those of late mental development, who have difficulty in pursuing their studies. Treatment: In the first class of cases, cessation of mental work, physical exercise of all descriptions, without fatigue and hydrotherapy. In the second class, a moderate amount of mental and physical exercise.

3. *Headaches from Digestive Disturbances.*—In children who eat too often, or too much, or too rapidly; appearing in from one to

three hours after a meal. Treatment: Strict regulation of diet; one of the bitter tonics before meals, warm drinks after meals; treat the constipation.

4. *Nervous Headaches.*—This form is easily recognized; it includes the headaches of those that are irritated by their surroundings, persons as well as circumstances, our future neurasthenics, epileptics, or hysterics. Treatment: Short douches, exercise, massage, valerian, aconite, and antipyrin for the hysterical patients; belladonna and the bromides for the epileptics. Avoid colds.

5. *Rheumatic or Gouty Headaches.*—These are sometimes accompanied by intense congestive phenomena simulating meningitis. They are recognized by their hereditary antecedents, by being associated with other pains,—neuralgias, arthralgias, myalgias; the urine contains a great quantity of phosphates, oxalates, and urates. Treatment: Moderate feeding, exercise in the open air, Russian baths and rubbing; laxatives; alkalies; salicylate of sodium in doses of from .25 to .30; tincture of colchicum, gtt. 10 to 15 daily.

6. *Headaches of Anæmia and Intoxication.*—In the first instance as the result of lack of fresh air, bad hygiene; in the second, by malaria, carbon monoxide, excessive medication (iodine, opium, digitalis, belladonna). Treatment: Remove the cause.

7. *Headaches Produced by Lesions of the Nerves of Special Sense.*—In the eyes, chronic conjunctivitis and keratitis, to be treated locally and with large doses of quinine; troubles of refraction, like hypermetropia and astigmatism, to be relieved by proper glasses. In the nose, polyps, hypetrophy of the turbinated bones, to be treated locally. In the ear, adenoid vegetations, otitis, foreign bodies in the external auditory meatus.—*Journal of the Medical College of Ohio*, June 1891.

PILOCARPINE IN ŒDEMA OF THE GLOTTIS.

In *La Médecine Hypodermique*, May, 1891, Dr. Suarez de Mendoza writes that in November, 1890, he was called in haste by one of his colleagues to examine the larynx of a young man suffering from œdema of the glottis and apparently at the point of suffocation. The situation was critical, and tracheotomy was under consideration, when on laryngoscopic examination it was noted that a small opening appeared between the œdematous tumors on each side of the larynx which became marked during respiration. The author, thinking that the case did not call for immediate surgical interference, proposed the employment of pilocarpine, which had already in his hands proved successful in two analogous cases. Accordingly three injections, amounting to $\frac{1}{25}$ grain of pilocarpine, were injected at intervals of twenty minutes. After the first injection improvement was visible, and one-quarter of an hour after the third injection all dangerous symptoms had disappeared.

THE CHANGES IN HEALTHY ARTERIES AND IN TENDON LIGATURES DURING THE FIRST FOUR WEEKS AFTER LIGATION.

At the meeting of the Royal Medical and Chirurgical Society, held May 26, 1891, Dr. Sheridan Delépine and Mr. C. T. Dent read a paper on the "Changes observed in Healthy Arteries and in Tendon Ligatures during the First Four Weeks after Ligation" (*Lancet*, May 30, 1891). The authors first explained the origin of the paper. They gave a detailed account of the state of healthy arteries five, nine, thirteen, seventeen, twenty, and twenty-three days after ligation in their continuity. They summed up these results as follows: 1. (*a*) When a healthy artery was tightly tied in its continuity and the ligature was sufficiently applied, a permanent obstruction was invariably obtained, whether a clot formed or not, and whether the point of ligation was near a collateral branch or not. (*b*) Up to the fifth day the proximal end of the occluded artery was gradually filled up with coagulated blood, which, by the fifth day, formed a plug composed of clots of various ages. Through the unequal shrinking of the various clots channels were produced, chiefly at the periphery of the thrombus, and into the crevices thus formed fresh blood penetrated. Thus a "spurious circulation" was established. (*c*) From the fifth to the thirteenth day the proliferating elements of the intima penetrated into the sides of the clot and bridged over its surface. By the thirteenth day tracts of young fibrous tissue extended all through the clot, and a thick layer of flattened cells, continuous with the intima, covered the proximal surface of the clot. (*d*) The remains of the clot were gradually absorbed, and by the thirteenth day only a few scattered masses of pigment indicated the previous existence of the thrombus. As the absorption went on the plug shrank, and ultimately its surface became concave. (*e*) While

these changes were going on within the vessel, similar processes occurred in the exudation surrounding the ligature outside the artery. Embryonic vessels formed in this region as well as in the artery. At first these embryonic vessels were simply solid columns or tracts of spindle cell, and were, therefore, only "potential vessels." (*f*) By the twenty-third day both the extraarterial and intraarterial new vessels began to extend through the degenerated muscularis close to the seat of the ligature. Inosculation of the new vessels took place, followed by canalization, and thus true circulation was able to take place through the new set of true vessels. (*g*) The ligature during the whole of this time underwent slow absorption, and was gradually replaced by young connective tissue. 2. From these results the following inferences were drawn: (*a*) That tight ligation of healthy arteries resulted in sound and permanent obstruction within two weeks; (*b*) that tight ligation with flat tendon ligature did not injure the fibrous coat of the artery, even though it were applied with sufficient force to cause complete rupture of both internal coats; (*c*) that the obstruction of the vessels by young fibrous tissue, replacing the clot, was complete long before the flat tendon ligature showed any sign of being absorbed or of giving way. 3. (*a*) The use of tendon was advocated, because this material was very uniform in structure and because the shape presented certain advantages; (*b*) tight ligation was advisable, because it gave results which were constant, and which were speedily and with certainty obtained. 4. The use of the loose ligature was deprecated, and in criticising that method allusion was chiefly made to Messrs. Ballance and Edmunds's paper, on account of its being one of the most recent and important contributions to the subject. Loose ligation should be avoided because (*a*) the method did not give constant results; (*b*) it did not give the same results as tight ligation within the same time; (*c*) it did not offer any advantages whatever as regards the operative procedure, and, if anything, was more troublesome to carry out than the recognized method. 5. In conclusion, the authors discussed the question briefly from the clinical point of view, and stated their conviction that the results of their investigation were supported by practical experience. They considered that tight ligation was the method least likely to lead to injurious consequences to the ligatured vessel, and most likely to bring about the effects which it was commonly desired to obtain by the operation.

The PRESIDENT said that he had devoted a good deal of thought to this subject, at which he had also worked practically, though not by modern microscopical methods. He had come to the conclusion that it was safer and easier for the surgeon, as well as more prudent for the patient, to have the vessel tied with such an amount of force as to divide its inner coat. This incurred no extra danger, and one was sure of producing a permanent obliteration of the lumen of the vessel. In the history of many of the cases of arterial ligature which had done badly, the cause was found to be due to a too early establishment of free circulation through the weakened vessel; the danger was a practical one, and was greater than the theoretical benefit from the avoidance of rupture of the internal coat. John Hunter, when he first tied an artery in St. George's Hospital nearly one hundred and thirty years ago, used three or four flat tapes in order to obliterate the vessel without division, and some surgeons at the present day were inclined to imitate this loose ligature. He thought that at the present time a sufficient amount of practical evidence had been collected to say that those surgeons who had used the tight ligatures had not been less successful than those who had employed the occlusion method.

MR. MACNAMARA agreed that the tight ligature gave the greatest chance of recovery to the patient. He had ligatured the common carotid, the external iliac, and the common femoral recently with a good result. He used silk ligatures which had been previously boiled in carbolic acid. The tissues around the artery were disturbed as little as possible in the application of the ligature; no blood-clot was left in the wound, deep sutures as well as superficial were inserted, and the part was kept at rest for a considerable time afterwards. Silk was as safe or safer than tendon, for there was no chance of the ligature expanding or giving way. He objected to the chromicized ligature, which remained for a long time in the wound, and, on the whole, his experience of it was not favorable.

MR. BALLANCE, after complimenting the authors on their elaborate and careful paper, said that he had studied the subject for many years, and had performed a very large number of experiments. The minute changes which had been described were identical with those which he had found, and which he had narrated in his lectures at the Royal Col-

lege of Surgeons. After one hundred and thirty-two days a tendon ligature was not entirely absorbed in the region of the knot. Encapsulation of the ligature invariably occurred in aseptic wounds, and, though an antecedent to absorption, was no bar to it. The multiplication of the endothelium he regarded as due to an alteration of nutrition. He hoped that the profession would suspend their judgment on this question till the whole of the recent work of himself and Dr. Edmunds was before them.

Mr. Spencer Watson said that the experiments which had been narrated had been performed on healthy arteries; but surgeons were often called on to deal with atheromatous vessels, when perhaps a loose ligature would be safer.

Dr. Delépine, in reply, said that the experiments of Mr. Ballance and Dr. Edmunds had been taken as a type of the action of the loose ligature. The experiments described in the paper were opposed to these, and he held that they proved the points which had been laid down.

Mr. Dent, in reply, said that the tendon remaining in the wound a long time was not an objection to its use. It was smoother and more homogeneous than silk, and was, therefore, better suited for the purpose of ligature. His conclusions were not drawn merely from the six experiments related: he had worked at the subject for a number of years, and had given an attentive study to all that had been published. By the term "loose ligature" he understood one which approximated the walls and occluded the lumen of the vessel without rupture of the inner coat. The experiments of Jones, which had been referred to, were not to be compared with those under discussion, for they were probably septic ligatures used in a wound which was allowed to become septic also.

EMPLOYMENT OF EXALGINE (METHYLACETANILIDE) IN INFANTILE THERAPEUTICS.

In the *Bulletin Général de Thérapeutique* for May 30, 1891, Dr. Moncorvo publishes notes of twenty-one different cases occurring in children where exalgine was employed, of which the following represents a *résumé* of his observations:

1. The marked activity of exalgine as an analgesic has been well demonstrated in twenty-one different children varying from 1 to 12 years of age, in whom it was administered in various painful affections.

2. In all the children the medicine was without exception well borne.

3. None of the complications, such as ringing of the ears, nausea, and dizziness, sometimes stated to have been observed in adults as a consequence of exalgine, were noted.

4. Exalgine was employed at first in the dose of ¾ grain daily, gradually increasing up to 5 grains.

5. Since the dose of exalgine is not disagreeable to the taste, it was given to most of his patients in substances applied directly on the tongue, while in some it was suspended in diluted wine.

6. All things being equal, the writer states that exalgine exceeds antipyrin in activity, and the same effects may be expected from it as might be looked for from a dose of antipyrin five times as large.

7. The author believes that the facts related in his report warrant the use of this analgesic in infantile therapeutics. One case of chorea, which was improved under the use of exalgine, points to the possible importance of this remedy in this disease.

CANTHARIDIN IN GRANULAR LIDS.

Dr. Juan S. Fernandez, of Havana, reports (*Progreso Medico*, May, 1891) five cases of granular lids in which he tried injections of cantharidinate of potassium. He was induced to do this by the fact that, in a case of tuberculous laryngitis treated by Liebreich, the patient had been under the care of Dr. Gutmann for granular lids since 1887. Treatment of one kind or another had been tried with little or no effect till during the administration of cantharidinate of potassium by Liebreich for the laryngeal disease, it was observed that considerable improvement was taking place in the ocular condition. The following is a summary of Dr. Fernandez's cases: 1. Man, aged 43, under treatment since September, 1889; the actual cautery had been applied to the left eye, and this had been followed by applications of sulphate of copper, nitrate of silver, sulphate of cadmium, and iodide of silver to both eyes; in spite of this, the granulations persisted. The cantharidin treatment was begun with a dose of ¼ of a decimilligramme, and at intervals of one day the dose was increased till, on the eighth day, 1 decimilligramme was reached. At this stage the patient became slightly feverish, and the treatment was discontinued for a time. The conjunctivæ were a trifle

paler, but there was no marked improvement otherwise. 2. A mulatto girl, aged 15, was treated in exactly the same way, but on the twelfth day the treatment had to be abandoned on account of the patient's timidity; the conjunctivæ were decidedly smoother than before. 3. A man, aged 32, with an acute granular condition of the lids and suppurative keratitis, was treated in the same way, but declined to go on with the injections on account of the pain which they caused. 4. A girl, aged 11; after the second injection the conjunctivæ were less injected, and had a healthier appearance; the treatment is being continued. 5. A very severe and old-standing case, with large granulations and opacities in both corneæ. After several injections the appearance of the conjunctivæ markedly improved; there was much less injection, and the surface was smoother. Dr. Fernandez thinks these results, though not brilliant, show that the treatment is, on the whole, worth trying.—*British Medical Journal*, May 30, 1891.

A LESSON IN ANTISEPTIC SURGERY.

On May 22, 1891, Sir Joseph Lister delivered the Cameron Lecture in Edinburgh, of which the following is an abstract (*Medical Press and Circular*, May 27, 1891): At the commencement of his address Sir Joseph announced that it would take the form of a lesson in antiseptic surgery, one that had been learned by him from bitter experience. In the sectional paper on this subject at the International Medical Congress at Berlin, he had expressed his belief that microbes, in the very attenuated condition in which they are present in the atmosphere, are not a source of danger, and that consequently all washing and irrigation of wounds might be abandoned if we could devise any perfect means of avoiding other methods of introduction of micro-organisms, and also of irritation by chemical antiseptics. Acting on the theory that the organisms present in air as atmospheric dust might be disregarded, he had since carried out that proposal in actual practice. The first case succeeded, and for a while all went well. In that case he tied the external iliac artery, and the peritoneum was drawn aside for a considerable distance, but no vessels of any size were cut. No antiseptics whatever were used to correct the admission of atmospheric dust, yet the wound healed without complication, and remained aseptic throughout. The next case, however, that of a woman with scirrhus of the mamma involving the auxillary glands, had a very different result. On the day after operation there was a copious discharge of serum and blood. On the second and third days the discharge continued, the temperature rose, the wound was throbbing, and red at the edges. It was evident that something had gone wrong. The discharge went on, the wound gaped, and erysipelas developed, which spread gradually over the trunk and limbs. The attack of erysipelas proved severe, chronic, and recurrent, but at length the patient was regarded as convalescent. Soon afterwards, however, a bedsore developed and the patient eventually succumbed. Death in this case was no doubt indirectly due to the erysipelas. He had seen no case of that disease starting in his wards for the last twelve years. Four days before the second operation a young man presented himself with an erysipelas of the face which he had acquired outside after an operation for necrosis of the lower jaw. He could not be refused admission, and there was no other accommodation available than the general ward, into which he was accordingly admitted. Special precautions were taken as to his nursing. The question arose, Could the fact of these two cases existing at the same time in the wards be something more than a mere coincidence? Might it not have been transmitted from one to the other? Further inquiry revealed the true state of affairs. It appeared that the sister in special charge of the case, who was well trained in antiseptic requirements, had been replaced by another, who had lately come from another institution where, as she expressed it, "they were not so strict in antiseptic surgery as we were." Further, the charge nurse had been transferred to night duty. Coming to the operation, it transpired that the nurse in special charge of the erysipelas case had actually handed the sponges to him which were used in the operation of the scirrhus of the breast. No blame was to be attached to that particular nurse. She was simply not sufficiently alive to the stern necessities of antiseptic surgery. There had therefore been ample opportunity of transferring the poison of erysipelas to the operation wound. To this sad picture there was fortunately a bright side,—namely, that although the woman was in the general wards, the disease had not spread. Special precautions were taken. The bed was placed next the door, the case was dressed last, and the dresser had to wash his hands in what was called the "strong" lotion. That

was a solution of one part of corrosive sublimate in five hundred of one to twenty carbolic solution. The two substances promoted one another's action, and constituted a potent germicide. It was pleasant to contrast this absence of extension with the experience of the old days, when the dressers went from one case to another often without even washing their hands. The discharge from the infected wound was found to be full of streptococci. Some of this matter was placed in sterilized tubes and handed over to Professor Crookshank, of King's College, for the purpose of making certain germicidal experiments as regards the lotions used.

Many previous experiments in that direction have been vitiated by the fact that in the transference of the material to be experimented on to the cultivation fluid, a small quantity of the corrosive sublimate has been transferred along with it, and the development of cultures has been thereby inhibited. Corrosive sublimate can be got rid of by ammonium sulphide. A sufficient quantity is added to combine with the corrosive sublimate and render it an absolutely inert sulphide of mercury. Professor Crookshank exposed some of the streptococcus for one, for five, and for fifteen minutes, to perchloride solution, and then added ammonium sulphide to render the mercury compound inert. The streptococci thus treated was planted in a sterilized cultivation medium of bouillon. That was nine days since, and the tubes now exhibited showed no sign of growth. That is to say, a solution of one part in four thousand of corrosive sublimate acting for one minute on the streptococcus of erysipelas had absolutely deprived it of vitality. Irrigation, therefore, would have destroyed the streptococcus in the wound. Still, irrigation is a troublesome complication that can, under certain conditions, be safely dispensed with. Considering the many ways in which septic material might be communicated, washing the wound with an efficient antiseptic lotion must be regarded as a necessity. It was our duty, concluded the lecturer, to learn from our mistakes, even when they involved so mournful a history as the present.

THE POINT OF SELECTION IN PARACENTESIS OF THE ABDOMEN.

Paracentesis of the abdomen is one of the most common, as it is one of the most ancient, of surgical procedures. The technique of its performance is based upon well-established principles, known to every practitioner, but there is still some difference of opinion as to the place best adapted for the puncture. Some surgical authorities recommend the median line as most suitable for paracentesis, while others express a preference for Monro's point of selection, which is a point situated in the centre of a line drawn from the umbilicus to the anterior superior spinous process of the ilium. Aside from the possibility of wounding the intestines or bladder, the chief danger in this operation is injury to the epigastric artery, and it has been claimed that this accident may be prevented by making the puncture at the spot selected by Monro. That this claim is not well founded is evidenced by a case recently reported by Dr. Frzebicky in the *Archiv für Klinische Chirurgie* (*International Journal of Surgery*, May, 1861), where a paracentesis performed at the latter place for an inoperable ovarian cyst was attended by so profuse a hemorrhage from the epigastric artery that it proved well-nigh fatal. This accident led the doctor to investigate the subject, and as the result of numerous experiments on the cadaver, he arrived at some conclusions which are of practical interest, both to the surgeon and physician. The investigations, which were carried out with unusual care, demonstrate the fact that, on anatomical grounds, the linea alba is the most suitable place for paracentesis, provided, of course, that no contraindication, such as adherent intestines, exists. By performing the operation in the median line, all danger of wounding important parts is avoided, although the puncture should not be made too close to the symphysis pubis to prevent injury of the bladder. It is also necessary to keep exactly in the middle since, in rare instances, a large branch of the epigastric artery passes along the side of the linea alba, injury of which may prove fatal. Although in the majority of cases, where the puncture is made at Monro's point of selection, the artery or its branches are not exposed to injury, there is a considerable minority where this accident is liable to arise. If, for some reason or other, paracentesis cannot be practised in the median line, the author recommends us to select the outer half of a line drawn from the umbilicus to the anterior superior spinous process of the ilium.

If the artery is injured by the trocar, it may be compressed by packing the wound with iodoform gauze, but if the bleeding is at all profuse, no time should be lost in ligating the vessel. Hence the author judi-

ciously suggests that, in cases where the puncture is made outside the linea alba, the surgeon should always be provided with the instruments necessary for ligation. In the absence of instruments and assistance, compression of the iliac artery may be tried, although it is frequently difficult to accomplish this procedure in a satisfactory manner.

CHLORIDE OF GOLD AND SODIUM IN DIABETES MELLITUS.

Dr. J. A. Robinson reports two cases of diabetes mellitus treated with chloride of gold and sodium, as follows (*Chicago Medical Recorder*, May, 1891):

Case I.—L. T., aged 52; a commercial traveller; married; no hereditary or specific disease, but a steady, moderate drinker and gourmand; weight, two hundred and three pounds; height, five feet eleven inches. Health has been good with the exception of occasional attacks of colic. One year ago he noticed he had to urinate very frequently, arising from six to ten times each night, and passing about three quarts daily.

Urinalysis.—Urine, color rain-water; specific gravity 1040; sugar by Haines's test.

Treatment.—Anti-diabetic diet, Budai Imperial wine, and five minims of chloride of gold solution, representing a dose of $\frac{1}{60}$ grain three times daily, gradually increasing dose until physiological action appears.

Repeated urinalysis during a period of eight weeks demonstrated a steady decrease of sugar until it became normal, and has remained so to date. Specific gravity 1019.

Case II.—Mrs. F., aged 50; Irish widow; height, five feet one inch; weight, one hundred and ninety-nine pounds. A rheumatic subject. Has undoubtedly had diabetes mellitus for ten years, but a urinalysis was never made until four months ago.

Urinalysis.—Color clear; odor sugary; specific gravity 1038; Haines's test; urinates from six to ten times a night; severe pruritus vulvæ; has excruciating pain in left heel, and ankles swollen at night.

Treatment.—Dietetic, no wine, and codeina, antipyrin, Cleman's solution of bromide of arsenic, et cætera, ad nauseam. A few weeks ago began chloride of gold and sodium treatment. Through a misunderstanding the patient took the salt in such rapidly-increasing doses, and for so long a period, that she was salivated. At length she sent me a specimen of urine, and it was free from sugar; specific gravity 1020; no polydipsia or polyuria. To date no reappearance of sugar in urine in either case.

EFFECTS OF SODIUM CHLORIDE BATHS.

M. Robin (*Bull. de l'Académie de Médecine*, No. 20, May 25) contributes a long paper on the use of brine baths, in which he attempts to systematize their use according to results obtained by chemical examination of the urine. According to M. Robin, these baths are indicated chiefly in three conditions,—1, all morbid conditions in which there is diminished nitrogenous excretion,—that is, diminution of nitrogenous exchange in the tissues; 2, lessening of nitrogenous oxidation constitutes the second indication; 3, the third indication depends on a special action of the treatment on the waste in tissues rich in phosphorus, or in those rich both in phosphorus and nitrogen. These are the three broad indications, but experience has shown him that the baths act differently according to their degree of concentration. Thus, it is found that a quarter-strength bath is most useful in cases in which it is not desired to increase either nitrogenous exchange or oxidation, in patients with a tendency to get thin, and who excrete an excess of uric acid. It will have little effect on chronic osseous affections. Half-strength baths will be applicable to cases with diminished nitrogenous exchange. They will be useful in all chronic glandular affections, strumous disease, periostitis, and chronic arthritis. Full-strength baths have a powerful effect on organic oxidation, and will suit patients with osseous affections, rickets, certain neuroses, certain forms of anæmia, and those who are being poisoned with the products of their own imperfect oxidation. They favor assimilation while diminishing the nitrogenous output. To recapitulate, saline bathing is recommended as the treatment for the lymphatic diathesis, scrofula, and its osteo-articular manifestations, rickets, chronic uterine inflammation, chronic rheumatism, some forms of anæmia, etc. Chemical observations also tend to show that it diminishes the production of uric acid, and that it is also a means of oxidizing imperfectly burned and toxic residues. M. Robin goes further, and declares that the degree of concentration must be very carefully regulated to fulfil these various indications. Applying this to particular cases, he considers at some length the use of the treatment in anæmia. He divides anæmic patients into two classes, the first comprising those with diminished nitrogenous

exchange and lessened oxidation, the second including those in whom nitrogenous exchange and oxidation are increased. The first class is amenable to treatment by iron, which increases tissue-change, while others are more benefited by the use of arsenic, or of the salt bath, which control these processes. The same considerations are applicable to other morbid conditions, such as obesity, gout, etc. The baths, with their power of raising the "coefficient of oxidation," will benefit those who are obese from failure of disassimilation, but it will have no effect on the obesity caused by too rapid assimilation. As regards gout, the strong baths are found to be unsuitable to the confirmed disease, and are only applicable when the lesions have become passive and have ceased to increase. This is explained by the observation that the urine in acute gout presents the type of excessive nutrition, while that of the chronic affection corresponds to the type of retarded nutrition. In the latter case the baths will act by increasing the nutritive activity, stimulating oxidation, and favoring the elimination of uric acid. Lastly, the oxidizing power of salt baths justifies their employment in certain auto-intoxications of intestinal origin, and in certain cases of neurasthenia and nervous troubles consecutive to acute febrile diseases. In short, in conditions in which there is impaired nutrition from imperfect assimilation, the saline baths should be efficacious; on the other hand, if the morbid condition arises from too active absorption or oxidation, the treatment will only have the effect of diminishing still further the resistance of the organism, and of playing into the hands of the disease.—*British Medical Journal*, June 6, 1891.

TREATMENT OF LEG ULCERS.

In *La Pratique Médicale* for May 27, 1891, DR. GUNTHER recommends a method of treatment which he claims has in his hands yielded the most satisfactory results. The first indication in his practice is to produce an aseptic condition of the ulcer, which is accomplished by first washing the ulcer with some antiseptic solution and then powdering it with a mixture of equal parts of salol and pure talc. The second indication, that of improving the nutrition of the surrounding parts so as to produce softening of the callous borders of the ulcer, and suppression of blood and lymphatic stasis, is accomplished by means of massage of the surrounding parts, and in the intervals by the application of wet compresses covered with rubber cloth so as to keep the parts in a permanent bath of moisture. After each *séance* with massage the borders of the ulcer are subjected to light percussion or tapping by means of a percussion hammer. The author states that after about fifteen days the callous borders of the ulcer have become softened, and the ulcer is by this time transformed into a simple wound and is in active process of cicatrization. If the ulcer connects with subcutaneous sinuses, as may be readily recognized by the sensibility in the border of the ulcer to pressure, these sinuses are opened by incision and subjected likewise to disinfection; when thus the ulcer is once transformed into a simple benign wound cure is accelerated by simple compression by means of adhesive plasters.

UNCONTROLLABLE VOMITING OF PREGNANCY.

This subject, of so deep interest to the practitioner, is at present occupying the attention of a large number of British and foreign obstetricians. Sixteen years ago there appeared in the *Journal* the now celebrated paper by Dr. Copeman, which was read all over the globe, and gave his name to the "method" or "practice" which he advocated. Copeman's method simply means dilatation of the cervix with the fingers. Undoubtedly it has proved of the highest service, whatever may be the precise nature of its action. Dr. Graily Hewitt, whose work on "Severe Vomiting during Pregnancy" appeared last year, traces the disorder to flexions, with inflammatory changes in the uterus, the vomiting, when established, causing uterine impaction. Other authorities, such as Dr. Henry Bennett and Dr. Marion Sims, trust in the application of counter-irritants to the cervix. Dr. Amand Routh, in a paper read in April at a meeting of the Harveian Society, strenuously advocated the painting of the cervix with a strong solution of iodine. The believers in flexion and in counter-irritants explain the benefits of Copeman's practice in a manner favorable to their own theories; it necessitates pulling on the cervix, and thus remedies a displacement; it involves handling of the cervix, thus constituting in itself a form of counter-irritation. There may be truth in all these theories. Dr. W. A. Duncan's practice of applying cocaine to the cervix may act as a sedative; but here again the defenders of counter-irritation maintain that it really acts as a counter-irritant through the mechanica

disturbance of the cervix required for its application. There is also a purely therapeutic school of obstetricians who put their trust in bromides, menthol, and other drugs. It happens that all contending parties can lawfully claim long series of cures on undoubted clinical evidence. On this fact Ahlfeld, Kaltenbach, and other obstetricians base their theory that the uncontrollable vomiting of pregnancy is a pure neurosis; it has been cured by sudden fright, or by anxiety about other matters besides the pregnancy. These observers, in turn, explain away all the other theories. Dilatation, counter-irritation, and rectification of displacements cure by acting on the patient's mind, they believe. Moral treatment alone may cure the vomiting. There remains, unfortunately, the fact that in many cases nothing stops the vomiting save termination of the pregnancy. The induction of labor is not without risk; the practitioner is unwilling to resort to it when the vomiting has not lasted long, while later on the patient may be fatally enfeebled by constant sickness; hence the gravity of the entire question becomes self-evident. No wonder so much is written on hyperemesis gravidarum, but much more remains to be done before anything like a sound routine practice, suitable to others than hospital obstetricians of extremely specialized experience, is established to the benefit of humanity and the comfort of the practitioner.—*British Medical Journal*, May 30, 1891.

ORIGIN AND RÔLE OF PUS-CELLS.

According to the Paris correspondent of the *Lancet* (May 30, 1891), PROFESSOR RANVIER made an interesting communication at a recent meeting of the Academy of Sciences on the origin and significance of pus-cells. He said that for some years past histologists generally were agreed that the cells of pus were none other than the white corpuscles of the blood, which had emigrated from the vessels at the time suppuration was set up. He found it difficult, however, to believe that the blood could yield in this way, and in a time comparatively short, the enormous quantity of pus found in many pathological conditions, such, for example, as the purulent infection of wounds, accidental and operative. That the white cells do emigrate in the manner generally accepted he had no doubt. This takes place under normal physiological conditions, while it is still more pronounced in certain pathological states not ending in actual inflammation, in the process of which it is of course abundantly evident. What his experiments led him to establish, however, was that pus-cells had also quite another origin,—viz., the transformation into lymph-cells of clasmatocytes, elements derived from migratory cells, which under the influence of irritation revert to an embryonic condition and proliferate rapidly. As to the *rôle* of the pus-cells, M. Metchnikoff has shown the importance of lymphatic cells in the combat of the organism against microbes. In simple inflammation determined by caustics, or other irritant agents, their *rôle* is not less important. They eliminate the dead elements, and thus prepare the way for the processes of regeneration.

TUBERCLE BACILLI IN DUST.

SCHNIRER records (*Wien. Med. Presse*) some very interesting observations in regard to the possible presence of bacilli in dust. On rinsing the dust from some grapes, bought on a warm day, late in the summer, he found the water afterwards quite dirty. Struck by the thought of the large number of phthisical patients who eject their sputa upon the streets, he injected 10 cubic centimetres of this water into the abdominal cavity of each of three guinea-pigs. One of the animals died in two days of peritonitis. The other two died in forty-five to fifty-eight days, respectively. Examination of the bodies disclosed pronounced tuberculosis, originating in the site of inoculation, and partially caseous nodules in the peritoneum, in the liver, and in the spleen, with but meagre deposits in the lungs. Tubercle bacilli were found in the nodules. Schnirer concludes that the conveyance was by means of the dust, as the water used was the pure spring water of Vienna, and the glass receptacle containing the water, the doctor's hands, and the syringe with which the injection was made had been previously sterilized. He assumes, though without direct evidence, that the vender from whom the fruit was obtained was healthy. The point Dr. Schnirer makes is that tubercle bacilli may be in the dust of public streets, and may be attached to fruit or other articles exposed for sale and afterwards used for food. This fear seems to be exaggerated and contrary to the inference deducible from Cornet's investigations, for Cornet failed to find bacilli in street dust.—*Druggists' Circular*, June, 1891.

THE VALUE OF THE PHYSICAL SIGNS AT THE APICES OF THE LUNGS IN SUPPOSED INCIPIENT PHTHISIS.

It is a fact well known to physicians generally that in health the percussion note at the apex of the right lung may occasionally be of higher pitch than that of the left apex. An examination of one hundred healthy symmetrical chests by DRS. FUSSELL and ADAMS, on the other hand, show that,—

1. A normal condition at the right apex may be considered a diseased condition.

2. A diseased condition at the right apex may be considered normal.

3. The normal disparity in favor of the right apex may mask diseased conditions at the left apex.

In the *University Medical Magazine* for June, 1891, these authors publish a tabulated list of one hundred cases, taken as they presented themselves at the dispensary of the University of Pennsylvania, the diseases for which these cases were under treatment having no influence on the condition of the lungs.

When it is taken into consideration that the usual site of tubercular infiltration is at the apex of the lung, and that among the first signs of consolidation of the lung are higher-pitched percussion note, increased tactile fremitus and vocal resonance, the importance of the determination of the value of these signs is at once apparent. Of course there are other signs of incipient phthisis; one of which, prolonged expiratory effort, is very suspicious of approaching consolidation, and is a phenomenon which is seldom misleading. It is in those cases where these other signs are absent, masked, or very slight that these variations spring into greater prominence. Again, undoubtedly, the higher-pitched note, when existing normally at the right apex, is perfectly resonant; it lacks the deadened quality noticed in commencing consolidation. Yet this difference in quality is hardest to distinguish in just those cases where the greatest doubt exists, so that practically this difference is of no use. It is of the utmost importance that signs which are perfectly normal should not be mistaken for those of diseased conditions. On the other hand, it is equally important that we do not overlook diseased conditions at either apex, considering the signs as those of health. In the incipient stage of phthisis, so vital is the diagnosis for the future of the patient, and so slight are the symptoms and signs, that every straw adds weight to the conception of the case. A positive diagnosis is demanded by patient and as eagerly sought by physician. The disease is presented in its incipient stage oftener to the practitioner than any other disease, as its symptoms and results are so well known to the laity. Hence, in the majority of normal lungs, we have conditions which at once add suspicion to our conception of cases in which incipient phthisis is feared.

In examining this table, consisting of the reports of the condition of fifty-eight men and forty-two women, we find that eleven, or eleven per cent., have the same percussion note at both apices; nineteen, or nineteen per cent., have slightly higher-pitched note at the right apex; and sixty-nine, or sixty-nine per cent., have markedly higher-pitched note at the right apex, while one was higher pitched at the left apex. In the ninety-two cases where vocal resonance was taken, ten showed no difference at the apices; fourteen showed slight increase at the right apex, and sixty-eight marked increase. In ninety-three cases where the tactile fremitus was taken, no difference was found in eleven cases, slight increase on the right side in twenty, while sixty showed marked difference. Two cases exhibited marked increase of fremitus at the left apex.

In pursuing the examination, as far as possible, the results were obtained separately by each observer, compared, and then obtained together. Many cases where slight variation occurred were verified in this manner. One observer percussed the chest, while the other listened in such a position as to be unable to tell which apex was being percussed. Any case in which there was any difference of opinion as to the existence of any variation was put down in the list as equal on both sides. All the ordinary rules of percussion and auscultation were observed. There was no desire to force cases into one class or the other; the attitude was simply to endeavor to find the exact truth on the subject.

Supposing a case to present itself with higher-pitched percussion note, increased tactile fremitus, and vocal resonance at the right apex, the question, of course, arises whether this is a diseased condition. One of three errors may be made,—

1. A normal condition at the right apex may be considered a diseased condition.

2. A diseased condition at the right apex may be considered normal.

3. The normal disparity in favor of the right apex may mask diseased conditions at the left apex.

It is accepted by physical diagnosticians that the larger size of the right bronchus accounts for the increase of vocal resonance and tactile fremitus, both being due to the same cause,—increased transmission of the voice-sounds. As to the reason of the higher-pitched percussion note at the right apex, there is less clear and united opinion. The note at the left apex ought, if anything, to be the higher pitched; the explanations of the contrary conditions existing are not satisfactory. One explanation is that the liver at the base of the right lung deadens the wave-sounds from the tissue above, while the hollow viscus, the stomach, serves more as a sounding-board for the left lung. The degree of tension of the thoracic parietes and of the lung-tissue itself may account for it, as the greater the tension the higher the pitch.

In conclusion, the authors affirm—

That higher-pitched percussion note, increased vocal resonance, and tactile fremitus are normal at the apex of the right lung as compared with the left; that this normal condition can occur in such a number of cases and to such a degree as to cause in many instances a diagnosis of consolidation at the right apex; that finally, in deciding doubtful cases, other signs besides these three are necessary to formulate a diagnosis; continued observation of cases, where other signs are lacking, being necessary to watch the possible development of actual disease.

The authors report in detail three cases, which illustrate the existence of these three possibilities of error.

CHANGES IN THE KIDNEY IN PHTHISIS.

The condition of the kidneys in phthisis has never been fully investigated. Several observers have described a fibroid condition. Becquerel and Rayher concluded that Bright's disease was very frequently associated with tubercular disease of the lungs. Peacock, in one hundred and seventeen cases of kidney-disease, found 30.7 per cent. of phthisis. Frerichs found that out of forty-two cases of Bright's disease six also suffered from phthisis. Bamberger stated that the disease was found in fifteen per cent. of those suffering from kidney-disease. In the *Centralblatt für Allgemeine Pathologie und Pathologische Anatomie*, February 1, 1891, Dr. C. von Kahlden publishes his results on the same subject. He is of opinion that slight degeneration of the renal epithelium is almost always found in active phthisis. It may, however, be so slightly marked that it is only visible on microscopic examination, and even then may be easily overlooked. The kidney may be either normal in size or somewhat enlarged. Macroscopically the following conditions are noticed: The surface of the organ is smooth and yellowish in color; the capsule peels easily; the cortex is usually slightly thickened, and also yellow in color; the medullary portion is pale. The microscopic changes chiefly affect the cortex, the parenchyma being first attacked. The epithelial cells undergo fatty degeneration, but are occasionally replaced by fresh epithelial cells. The interstitial changes are, therefore, secondary, and generally slight, and take the form of a small round-celled infiltration, and some increase of the connective tissue. The glomeruli also take part in the degeneration. The cortex is not uniformly affected, but the changes take place in patches. These lesions are evidently chronic, as is shown by the thickened capsule, the atrophy of some of the glomeruli, and the changes in shape of the epithelial cells of the tubules, these being altered from a club form to a cubical or cylindrical shape. Clinical symptoms which accompany the renal degeneration are unreliable. Albumen in the urine is rarely present. The author states that the condition is one of a chronic parenchymatous nephritis, and thinks that it may be caused by the poisonous products of the tubercle bacilli.—*Lancet*, May 23, 1891.

URIC ACID IN DISEASES OF THE NERVOUS SYSTEM.

In the quarterly journal, *Brain*, spring number, 1891, Dr. Haig gives an interesting and instructive *résumé* of the influence of uric acid upon the system, and particularly upon nervous tissues.

As is well known, Dr. Haig has given great attention to this subject, and has made the influence of uric acid on the human economy the subject of extended and careful investigation. His statements, therefore, should command attention, and we are sure that a brief *résumé* of his conclusions cannot fail to be of value to our readers. (*Cincinnati Lancet Clinic*, June 20, 1891).

He first quotes the statement of Sir A. Garrod, that "the causes which predispose to gout, independently of those connected with individual peculiarity, are either such as produce an increased formation of uric acid in the

system or lead to its retention in the blood." Dr. Haig's investigations have led him to discredit the former of these causes and to attribute all uric acid diseases to its retention in the blood and in the tissues. He prefers the terms uricæmia or uric-acidæmia to designate these conditions. He is in accord with Murchison in his description of lithæmia as the symptomatology of uric-acidæmia, but does not attribute these to disturbed action of the liver, holding that the liver symptoms are concomitant or secondary and are the results of excess of uric acid, and he further believes that this excess is due to the failure to excrete it in the normal proportion of one to thirty-three of urea.

His investigations relating to the causation of migraine are detailed at considerable length. His attention being called to the relation of migraine to gout by Liveing and others, he discovered that the urine secreted during a headache always contains a considerable excess of uric acid in the proportion of one in twenty or one in twenty-five to the urea, while that excreted immediately before the attack of headache began contains a diminished quantity,—one in forty to the urea. Aching pains in the limbs, lassitude, and depression of spirits he finds quite common in uric-acidæmia.

Noting the statement of Sir A. Garrod as to the action of beer and wine in producing gout, he tested these and found them strongly acid. This led him to experiment with acids and alkalies, and, as he says, "I found, to my surprise, that I was able to alter the excretion of uric acid in either direction at pleasure." He then soon found that he could, by influencing the excretion of uric acid, also influence the headache as well, acids relieving or removing the headache, while alkalies made it worse. He also found that by giving acid for a day or two he could store up the uric acid in the tissues, and then by giving an alkali could wash it out into the blood and urine and bring on an attack of headache at will.

Since that time he has been able to show "that if uric acid is previously removed by a course of salicylate of sodium, a dose of alkali will produce neither a plus excretion of uric acid nor a headache." From this he infers that the headache is proportional to the uric acid in the urine, and "that the amount of this in the urine may be regarded as an index of the amount in the blood."

The relation of migraine to epilepsy led him to investigate this disease, in which he found a minus excretion of uric acid preceding a fit and a plus secretion accompanying.

The relation of mental depression and mental exaltation to this variation in uric acid excretion also engaged his attention. He was able to connect the exaltation with its diminished excretion, and depression of spirits with its increase.

The "intense and persistent coldness of the hands and feet in an attack of migraine" led him to note "that the pulse was slow and the vessels full during the attack." The tracings which he has accumulated conclusively prove, as he thinks, that he has "practically complete power over the rate and tension of the pulse." He states that "arterial tension varies with the amount of uric acid in the blood when combined with alkali (soda or potash), but is little affected by it, even though present in considerable quantity, if combined with a salicylate (salicyluric acid)." He thinks that opium produces its well-known effects on the mental condition through its effect on the circulation of the brain, which is secondary to its effect on uric acid, and that this depends on its influence on the alkalinity of the blood, and so on the solubility of the uric acid.

The chief substances which diminish the excretion of uric acid in the urine are "acids, iron and lead, and opium, and those which increase it are soda or potash under certain conditions, phosphate of sodium and salicylates." Mercury, he states, also markedly reduces the excretion of uric acid in the urine, reduces the tension of the pulse, and produces diuresis.

In the removal of the uric acid headache, which he thus attributes to the local vascular effect of the uric acid upon the blood-vessels of the brain, he places great value upon a regulation of the diet, "one of which milk, fish, and eggs constitute the only animal food completely removing the attacks, and without the use of any drugs whatever." "I believe that a man eating meat three times a day, and drinking acid beer and wine, may keep back and store up in his body several ounces of uric acid in a few years, while on the above diet he would not store up as many grains."

He mentions that Professor Lange, of Copenhagen, connected certain conditions of periodical depression with the uric acid diathesis, and treated them successfully by a diminution of meat foods, etc., and that Dr. Broadbent notices the frequent association of melancholia and mental depression with high tension of the pulse, and records their successful treatment by the milk diet. He believes that "many a case of suicide, and some murders, might be prevented by a timely dose of acid which would free the brain circulation from the power of the acid."

HOW TO GET A SUGARLESS MILK.

Milk is usually forbidden diabetics on account of the sugar (galactose and dextrose) which it contains. DR. A. E. WRIGHT has discovered a method of making sugarless milk (*British Medical Journal*). Take a quantity of milk, dilute it with three or four volumes of water, to which 1 to 2 parts per 1000 of acetic acid have been added. This produces a precipitation of all the casein and fat of the milk. The precipitate is allowed to settle for a few minutes, and then strained through a piece of calico. The precipitate is then washed, and redissolved in a one per cent. solution of the following mixture of salts:

	Parts.
Sodium chloride	11.5
Potassium chloride	9.9
Monopotassium phosphate	13.8
Dipotassium phosphate	10.0
Citrate of potassium	5.9
Dimagnesium phosphate	4.0
Magnesium citrate	4.4
Dicalcium phosphate	8.0
Tricalcium phosphate	9.6
Calcium citrate	25.5
Calcium oxide	5.5
Sodium carbonate	40.0

A trace of saccharin may be used to sweeten the milk, and the salt solution is best used at about blood temperature, and the casein and fat precipitate is to be mixed up with it, as in making cocoa, to the desired thickness. We obtain by this easy method a very fairly palatable and entirely sugarless milk. The precipitated casein and fat can also be dried without undergoing alteration, and then used for the preparation of the milk.—*Medical Record*, May 30, 1891.

Reviews.

TWELVE LECTURES ON THE STRUCTURE OF THE CENTRAL NERVOUS SYSTEM. FOR PHYSICIANS AND STUDENTS. By Dr. Ludwig Edinger, Frankfort-on-the-Main. Second revised edition, with 133 illustrations. Translated by Willis Hall Vittum, M.D., St. Paul, Minn. Edited by C. Eugene Riggs, A.M, M.D. Philadelphia: F. A. Davis & Co.

The first thing in this volume that strikes us, as reviewers accustomed to the fine work of some of our larger medical publishing houses, is the appearance of cheapness which everywhere haunts the surface, both printed and figured, of the pages; but when we look at the accompanying card we find that the price of the book is only a dollar and seventy cents, and so, as the type is after all clear and easily read, we are in a measure reconciled. Nevertheless, the physical degradation of our literature, which was specially introduced into medical literature by the so-called Wood's Library, and which is spreading slowly, seems to trend towards loss of dignity in the profession. It will be bad for our profession when "cheap and nasty" become familiar bywords in thoughts concerning it. We suppose that the plates of the present volume are photographic reproductions of the originals. They are too ugly and coarse to be the originals themselves; and unless they are photographic work, there is no excuse for the translator translating the text and not translating the figures. What is a "Stabkranz," or a "Rückenmark," or a "Schleife," or a "Haube," or a "Fuss," or a "Hinteres Längbündel," to say nothing of a "Körnerschicht," or a "Oberflächliches Mark," to the native citizen who proudly unfolds the stars and stripes to the wondering world, and defies alike English naval armament, German artillery, and Teutonic polysyllables!

We have no fault whatever to find with the text of the book. We believe, so far as we have been able to grasp it in these holiday months, that it is clear and correct. The sentences are short, direct, and free from that hopeless involution which so delights many a German intellect and so absolutely exasperates the simple convolutions of an Anglo-Saxon.

Correspondence.

BERLIN.

(From our Special Correspondent.)

Koch's Present Occupation—The New Koch Institute—A Joke of Professor Brieger—Henoch *versus* Koch—Lamentable Condition of German Physicians—Philadelphia Diplomas—Professors Mosetig and Adamkiewicz join the Discoverers of Secret Cures—A Secret Remedy against Warts—An Explosion with Chromic Acid.

Although we are done with Koch, Koch is not yet done with us. It cannot be expected from a man with Koch's energy and mind that a failure, however momentous, should act as a discouragement. Koch firmly believes in the ultimate success of his cure and in his mission to relieve mankind from one of the greatest scourges. In fact, a new and startling publication of the professor will be

issued shortly. Ever since his return from Egypt, Koch has been at work day and night in his private laboratory with tuberculin. I am privileged to state that just now Koch has succeeded in isolating the active principle of tuberculin. The new publication will also contain exact directions about the method of preparation, so that every chemist having a knowledge of bacteriology will in future be enabled to prepare the remedy. Koch feels confident that after isolation of the active principle tuberculin will be entirely void of a dangerous element.

Meanwhile, the seven barracks constituting the "Koch Institute" have been completed, and will be inaugurated next week with considerable ceremony. Every visitor entering Berlin by the Elevated, which passes close to the Charité campus, notices the long line of white and curious-looking barracks, and cannot but inquire as to their use. Alongside of the seven barracks destined for the reception of patients there are two for nurses, one for disinfection and autopsies each, one for coal and ice, and one for the officials of the institution. There are one hundred and eight beds in all. Great care has been used to protect the buildings against deleterious agencies emanating from either soil or atmosphere by undermining and protecting them with beton and gypsum plates of considerable thickness. Each room is surrounded by an empty chamber to insure perfect ventilation, and the walls consist of oiled enamel to facilitate their cleaning.

Allow me to insert here a little anecdote concerning Professor Brieger, Koch's successor in the Hygienic Institute. A distinguished foreign physician paying a visit to the Institute found the professor busily at work in the laboratory surrounded by the most formidable array of chemical and bacteriological utensils. The professor's sole attention and care, however, appeared concentrated on one particular vessel which was enveloped by smoke and steam. "Guess what I am boiling here," said the professor to the visitor. The latter began to enumerate the entire scale of microorganisms from the cocci to the spirochetæ. "No, sir," quoth Brieger, "these are hot sausages."

A few days ago I had an opportunity to listen to a clinical lecture of Professor Henoch, in which the latter stated his reasons why he had taken a firm stand against the Koch remedy. "This child, gentlemen," said the professor, presenting a girl of about 10 years of age, who had come to the polyclinic, "is a victim of tuberculin. Last year, during the 'Koch epidemic' [Henoch's own words], the patient was sent to us by an eminent physician to be subjected to the new treatment. Physical examination and subjective appearances did not point to tuberculosis, but an occult tubercular process was taken for granted, all the more as the patient reacted regularly to the injections. The patient got on pretty well and evenly until suddenly she began to cough up pus. This symptom, alongside of bronchial breathing and a suddenly-appearing dulness at the base of the right lung, were the evidences that we had to deal here with abscess of the lung, as the result of tuberculin injections. The abscess had not yet healed after the lapse of six months, as the patient was still occasionally coughing up pus." Ever since that experience, Henoch stated, he was a decided adversary of the Koch cure, and as long as he presides over the pediatrical department of the Royal Charité tuberculin will not be tried again.

The Berlin physicians are just now greatly agitated by the question of "Krankenkassenaerzte" (physicians of sick-benefit societies). Hitherto a member of such a society was compelled to consult the doctor of the society, who received a yearly salary for his services. As all Berlin workingmen and working-women are legally compelled to belong to a sick-benefit society, the work of doctors elected by such societies is naturally an enormous one. Their houses are actually besieged by patients, while hundreds of other physicians have no patients at all. The consultations which the "society doctors," as I will call them, grant to each patient are ridiculously short and absolutely incapable of benefiting the patients. I have heard of doctors "doing" over one hundred patients a day, and also learnt the number of minutes allotted to various consultations.

Minor surgical cases...	15	minutes.
Gonorrhœal affections.....	10	"
Headache and other pains...	5	"
Influenza.....	6	"
Rheumatism.....	6	"
Examination of the lungs....	5	" etc.

It is evident that this state of affairs is an improper one and equally undesirable for both patients and doctors. To enhance the morbid character of the affair, the compensation of the physicians is a ridiculously low figure,—viz., *eight Pfennige* (two cents) per cons[illegible]

tion, on an average. This figure is no fancy of your correspondent's brain, but has been officially fixed by statistical investigations and has been published broadcast in all papers. Imagine the blissful state of the practitioner rewarded by two cents for an auscultation of the chest. At last the Berlin doctors have waked up and taken energetic steps towards extinction of this shameful condition.

"Striking doctors" is the latest acquisition of the day. In Dresden the "society doctors" refuse to grant consultations to members of the sick-benefit societies as long as Naturaerzte (natural physicians) are elected by the societies and put on an equal level with them. The societies are in despair, as they find no Dresden physician who would accept the office under the conditions mentioned. It is a singular fact that the so-called Naturaerzte are gradually developing a formidable competition to the regular physicians. Dietetic, hydropathists, and electric physicians flourish nowhere else more than in Germany. Possibly it is not known universally in America that the German physician is absolutely unprotected by the government since the introduction of Gewerbefreiheit (*i.e.*, trade-freedom, meaning license to carry on any trade or profession whatever). The government prosecutes all those carrying the title of "doctor" or "physician" illegally, but allows every barber and huckster to practise medicine. Apropos of the title "doctor," a hot fight between the government and a "doctor Philadelphiæ" has just come to an end. Hugo Ascher, doctor of dental surgery, a graduate of the University of Pennsylvania, wanted to "hang out" as Dr. Hugo Ascher. As in Berlin no shingle or sign can be put up without the sanction of the government, Dr. Ascher duly asked permission to put up his doctor shingle. The president of police, however, concluded that a man having a Philadelphia diploma is a fraud just as well as the "Philadelphia University," and on this ground interdicted the doctor shingle. The plucky Dr. Ascher, however, sued the president of police and was successful to a certain extent. His sign was allowed to read Hugo Ascher, Dr. of Dental Surgery, but he was forbidden from signing "Dr. Hugo Ascher." The stigma resting on all Philadelphia diplomas will probably not be taken off for some time. Your correspondent desired some time ago to take certain special courses at the Charité clinics and found it desirable to matriculate. He was surprised to find his title of doctor, which he had earned ten years ago at the University of Pennsylvania, ignored on his official matriculation papers. Seeing Professor Tabler, the rector of the University of Berlin, about it, your correspondent soon learned that a Philadelphia doctor was a humbug who evidently had no right to his title. All New Jersey or backwood diplomas are good in Berlin, while Philadelphia sheepskins remain a fraud. Would it not be indicated for Mr. Charles Meyer, the imperial German consul at Philadelphia, to notify the officials of the empire as to the character and worth of Philadelphia diplomas?

Now that Koch and Liebreich are quieted down, Professor Mosetig has taken the stump, and announces with great pathos and enthusiasm his new remedy against tuberculosis. The professor does not as yet divulge either name or nature of his new remedy, but merely states that it is quite harmless, and has both a local and constitutional reaction. Almost simultaneously Professor Adamkiewicz, of Cracow, announces his secret remedy against cancer. A number of cures are alleged to have been perfected by this remedy. I think it would be better for such celebrated men as Mosetig and Adamkiewicz if they would concentrate their mental abilities on a good remedy against coryza or influenza than pursuing a course where only disappointment and discredit await them. The profession will no longer listen to a consumption or cancer cure, no matter who is the discoverer.

Speaking of secret remedies, there is a specialist of warts in Berlin who in removing warts is eminently successful. His secret remedy consists in Fowler's solution, which he gives in weekly increasing doses to adults 2 drops three times a day, to children ½ a drop three times a day.

An explosion occurring here recently in a drug-store with chromic acid will interest all physicians. A physician prescribed

℞ Sol. acidi chromici, 10 in 200;
Acidi salicyl., .2;
Alcoholis, 15. M.

The druggist added the crystallized chromic acid directly to the alcohol, whereupon a violent explosion followed, destroying his eyes. The druggist ought to have known that chromic acid acts as a violent explosive when in contact with glycerin, ethereal oils, or alcohol, due to its extraordinary hygroscopic properties.

Notes and Queries.

THE AMERICAN SOCIETY OF MICROSCOPISTS.

This association, now in the thirteenth year of its existence, will hold its fourteenth annual meeting in Washington, D. C., August 10, and continue in session five days. Its roll of active members contains about three hundred and fifty names, embracing very nearly every person in the United States who is at all prominent as a microscopist. Its membership consists of two distinct classes,—viz., professional men and students of the natural sciences, who use the microscope in their daily avocations as an instrument of research, diagnosis, or precision; and amateurs, or those who find pleasure and profit in the revelations of the instrument. Many of the latter class, from having early chosen special lines of study and investigation, have acquired high reputations in their respective departments of microscopical research. In its earlier years this class predominated in the membership of the society, but at present the professional element is largely in excess.

The qualifications for membership are very simple. The applicant must be a respectable person socially, and interested in the use of the microscope. (*St. Louis Medical and Surgical Journal*, May, 1891.)

The advantages of membership are dual in their nature,—*i.e.*, general and social, or those which accrue to the individual from association with others engaged or interested in the same pursuits in any and all walks of life; and special, in that the meetings of the society are to a certain extent educational in their nature. In the "Working Sessions" experts in every department of microscopical technology are engaged in giving manual demonstrations of the details of their lines of work; in the informal evening "conversaziones" the room of every worker who has anything special to exhibit or demonstrate is open for the reception of all those who wish to witness the demonstration; finally, the *soirée* affords an opportunity of displaying for the benefit of the members, as well as the public generally, all that is most beautiful, interesting, and instructive in the cabinets or laboratories of the exhibitors. Of late years the *soirées* have been attended by many thousands of visitors in every city in which the society has met, and have been regarded as distinguished social as well as scientific events.

The dues are trifling, only two dollars per annum, and in return the member gets a volume of the Annual Proceedings, which costs very nearly this amount. These proceedings are elegantly and profusely illustrated with photo-engravings, autotypes, chromoliths, and wood-engravings, done in the highest style of art. There is scarcely a subject in the whole range of microscopical work upon which information may not be found by reference to the indexes of these volumes, and collectively they form a library of microscopy full of invaluable matter to the student and worker.

The railroads have of late years extended excursion or convention rates to and from the places of meeting, and, although no arrangements have as yet been definitely made, we can assure our readers that the Washington meeting will be no exception to the rule. Indeed, it is probable, from the fact of the meeting of the American Association for the Advancement of Science in Washington only three days after our adjournment, that a more than usually advantageous arrangement may be obtained.

The museums and libraries, as well as the many other objects of interest of the national capital and its surroundings, will be open to the visits of the members, and special facilities for seeing them will be accorded.

Special hotel rates will also be secured. An announcement of the railway fares, hotel rates, etc., will be made hereafter.

In view of the facts related, and from assurances that we have already received, we are justified in saying that there will be present the largest number of old members of the society ever in attendance at an annual meeting.

We invite and urge upon all persons, professional or amateur, interested in microscopy and not already on the rolls, to send in their applications for membership to the secretary, Dr. W. H. Seaman, No. 1427 Eleventh Street, Washington, D. C. The application should be accompanied by three dollars, which is the initiation fee and one year's dues. As it is more than probable that the initiation fee will be increased in the near future, it will be to the advantage of all who contemplate membership to send in their applications before the next meeting.

Any further information concerning the society or the approaching meeting may be obtained on addressing any of the following:

Frank L. James, President, Box 568, St. Louis.

W. H. Seaman, Secretary, No. 1424 Eleventh Street, Washington, D. C.

C. C. Mellor, Treasurer, No. 77 Fifth Avenue, Pittsburg, Pa.

QUININE ALBUMINATE.

A preparation described as being a homogeneous compound of egg albumen with quinine, possessing the remarkable property of not being decomposed by the strongest alkalies, has been recently introduced by M. Tarozyi (*Union Pharm.*, May, p. 196). It is claimed that the preparation is easily absorbable by the mucous membrane of the stomach and passes into the circulation, where it exercises its therapeutic properties without undergoing decomposition, under conditions in which the ordinary salts of quinine are broken up by the alkaline liquids of the system. This "albuminate of quinine" is stated to be prepared by double decomposition between sulphate of quinine and albuminate of soda, but the manner of operating is not indicated. The product is a white amorphous bitter substance, said to contain fifty-six per cent. of quinine; it is alkaline in reaction, dissolves more readily in hot water or alcohol than in cold, and more freely still in water acidulated with lactic or hydrochloric acid. It may be distinguished from other salts of quinine by treating it with water, acidulated with sulphuric acid, which forms with the quinine soluble acid sulphate, the albumen being precipitated after standing.—*Pharmaceutical Journal and Transactions*, May 30, 1891.

CHLORAL-PHENOL AND PHENOL CAMPHOR.

Chloral has the property, when rubbed with certain bodies, such as camphor, of forming therewith syrup liquids. With phenol (absolute carbolic acid) it also liquefies, and a preparation composed of equal parts of phenol and chloral is used in medicine for allaying toothache, as well as for its antiseptic properties. A recent study by FABINI, says the *Chemist and Druggist*, shows that chloral-phenol possesses the odor and taste of its constituents, and when applied to the skin produces inflammation and an eruption of small blisters. It is a colorless and clear liquid, having a sp. gr. at 20° C. of 1.289, so that it sinks in anhydrous glycerin. It is soluble in alcohol, acetic acid, amyl-alcohol, chloroform, carbon bisulphide, and glycerin, as well as in ether when slightly warmed. It is only partially soluble in petroleum ether, and benzine only dissolves a little of the fluid, and what is dissolved is chloral-phenol. Fabini tested the fluid thoroughly, with a view to determining whether it is a mechanical mixture, and it behaved in every way towards reagents as carbolic acid does, while with sulphuric acid some of the chloral-phenol yielded, after twenty-four hours, a velvet-colored plaster-like mass, which consisted of meta-chloral and phenol-sulphonic acid. There seems to be no doubt, therefore, that chloral-phenol is a mixture.

This preparation should not be confounded with the phenol camphor devised by Cockrane (not campho-phénique), and made by mixing together 1 part of carbolic acid and 3 parts of camphor. After twenty-four hours this becomes a liquid, having a sp. gr. of .990. It is used with oil as an antiseptic. As a spray it may be applied to the skin to produce loca-anæsthesia. It may be employed for disinfecting surgical instruments, and as wool and gauze for wound dressing. It is soluble in alcohol, ether, and oils, but not in water or glycerin. Menthol, cocaine, salicylic acid, iodoform, chloral hydrate, and mercuric chloride are soluble in phenol camphor.—*Pharmaceutical Record*, June 11, 1891.

ELIMINATION OF IRON BY THE BILE.

That iron is present in the bile has been known for a long time, but the exact quantity eliminated by this channel and its significance have perhaps been exaggerated by some physiologists. Hamburger's researches, although ten years old, are still of great importance, for he established the fact that the largest part of the iron introduced into the body, either naturally in the food, or given in the form of preparations of iron, is eliminated in the fæces, a very minute trace by the urine, and excessively little by the bile. Thus a dog, in the course of thirteen days, received 180 milligrammes of iron, and in the same time 136.3 milligrammes were eliminated by the fæces, 38.4 milligrammes by the urine, and 1.8 milligrammes by the bile. He also showed that the iron eliminated by the bile is but little influenced by variations in the amount of iron introduced by the mouth, so that the iron in the bile must be regarded as an index of the hæmatopoietic or hæmatolytic action of the liver. DASTRE (*Archives de Physiologie*) subjected a large dog, with a bil-

iary fistula, to a strict dietary, and collected most carefully the bile excreted daily. He finds that the proportion of iron in the bile excreted is very variable. As a mean, it is .94 per cent. of the dry residue, although there are very considerable variations even in a regular and exactly similar diet, so that Dastre also finds that the hepatic iron depends more on the blood formation or blood destruction in the liver than on the alimentary conditions. The quantities of iron excreted in the bile of a dog weighing 25 kilos (55 pounds) vary from 2.34 to .09 milligrammes per day per kilo weight of the animal.—*Medical Record*, June 13, 1891.

NEW METHOD OF TREATING VARICOSE VEINS.

At the German Surgical Congress, Dr. Landerer, of Leipsic, communicated the details of a new method of treating varicose veins. This consisted in the application of a kind of truss, that was applied like a garter, and by its permanent pressure on the saphena vein effected a cure. Pressure was obtained by an india-rubber pad situated on the inner surface of the truss and filled with water. The pressure was constantly kept up until the wall of the dilated vein was ulcerated through. He had adopted this method of treatment from an observation of a deceased colleague, Herr Ravoth, who treated varicoceles by the application of a truss. Professor Bardeleben remarked that Ravoth had himself often told him that his cures of varicocele had not been permanent; he feared that Landerer's procedure would not effect a lasting cure.—*Medical Press*, June 13, 1891.

MUSHROOMS AS FOOD.

The alarming symptoms which occasionally follow the use of fungi when taken as food are familiar to most of our readers. The risk in this particular, however, is less than it might be. In actual market custom we recognize but a very few forms of edible fungi, though it must be allowed that even in these we are liable to deception of a somewhat dangerous kind. It is therefore a matter of some importance that the public mind should be informed as far as possible of the qualities which distinguish the edible from the poisonous varieties. To give a precise definition which would also be comprehensive is, however, no simple matter, and as a matter of fact the number of edible fungi, even in this country, is much greater than is commonly understood. It may be said, however, that a high color, a scaly or spotted surface, and tough or watery flesh are usually associated with poisonous properties, while the edible species are but seldom highly colored, scaly, or spotted, but usually white or brownish, and brittle on fracture. The former, moreover, grow clustered on wet or shady ground, the latter singly in dry pastures. The common British mushroom is known by its pink hymeneum or gills. Fungi which have a bitter or styptic taste, or which burn the fauces, as well as those which yield a pungent milk, those of livid color, and those which on bruising assume various hues, ought to be avoided. It should be remembered also that all plants of this class readily undergo decomposition, and should therefore be eaten as fresh as possible.—*Lancet*, May 30, 1891.

INCOMPATIBILITY OF COCAINE AND BROMIDE OF SODIUM.

In *La Pratique Médicale* for June 19, 1891, it is stated by M. L. Racine that having to prepare a solution of bromide of sodium and hydrochlorate of cocaine, on dissolving these substances in water and mixing them a grumous precipitate was formed, which gradually rose to the surface of the liquid. It seems that this precipitate is actually the cocaine, which is thrown out of solution, and the dangers of such a mixture are self-evident, for the cocaine floating on the top of the mixture would be given in a larger dose than was intended.

CONDITION OF VASCULAR TENSION IN PULMONARY PHTHISIS.

At the meeting of the Société de Biologie, held on May 16, 1891, Dr. Marfan (*Le Progrès Médical*, May 23, 1891) stated as a result of his investigations by means of the sphygmomanometer of Potain that in all cases of pulmonary phthisis, whether in a febrile state or not, whether under the influence of drugs or not, arterial tension is notably and constantly diminished. Instead of registering a pressure of seventeen to eighteen centimetres of mercury, the normal blood tension, under such circumstances the pressure oscillates between fifteen and ten centimetres. Fever and the cachexia of advanced stages of phthisis still further diminish this condition. The author finally calls attention to the fact that this diminution in arterial tension is not

only a constant phenomena, but is a very early sign of phthisis, and thus is worthy of attention from a diagnostic point of view.

OSMIC ACID IN GOITRE.

In the *Journal of Laryngology and Rhinology* for June, 1891, there is published the account of a female patient under the care of DR. S. H. AUERBACH, who was treated by parenchymatous injections of osmic acid, local massage (fifteen minutes' *séances* once daily), and internal administration of iodide of potassium. The acid was employed in the shape of an aqueous solution (one grain of crystallized acid to two drachms of water), a syringeful of which was injected once daily, or every other day, for three weeks. By the end of the period the tumor decreased one-half, while all subjective symptoms disappeared. The author believes that the method should be preferred to excision, since it is free from such dangers as the development of cachexia strumipriva, etc.

THERAPEUSIS OF LOCOMOTOR ATAXIA.

According to the Paris correspondent of the *Lancet* for June 6, 1891, at a meeting of the Société de Biologie held on the 23d ult., M. DEPOUX communicated a case of locomotor ataxia successfully treated at the Val de Grâce military hospital by injections of testicular juice after the method of Brown-Séquard. The symptoms noted were inco-ordination of movement, absence of patellar reflex, enfeeblement of sexual power, loss of muscular sense, slight amblyopia, and lightning pains in the lower limbs. After having been subjected without benefit to the usual methods of treatment—electricity, suspension, thermo-cauterization, large doses of potassium iodide, etc.—Brown-Séquard's famous juice was tried and the symptoms all disappeared. Even the knee-jerk reappeared, and the man is reported to be now strong and well. In criticising the conclusions of M. Depoux, M. Dejérine doubted the existence in this case of actual sclerosis of the posterior columns, believing that we had to deal rather with pseudo-tabes of peripheral or dynamic origin. M. Babinski reminded the society of the occasional occurrence of recovery from tabes, and he cited the case of a woman, ataxic for twenty-three years, who for five years before death had lost her lightning pains, gastric crises, atrophy of the optic nerves, etc. At the necropsy the accuracy of the diagnosis was amply confirmed. It is to be noted, however, that in this instance the knee-jerk remained permanently suppressed. M. Dejérine recalled the observation first made by Benedikt, that when tabes dorsalis commences with amaurosis, ataxic symptoms rarely manifest themselves, atrophy of the disk appearing to exercise an inhibitive influence on the spread of the sclerotic process in the posterior columns.

AVOIDANCE OF STIMULANTS DURING HEMORRHAGE.

It is customary, when the accident of hemorrhage occurs, for the operator, or some by-stander, to administer wine, brandy, or some other alcoholic stimulant to the patient, under the false idea of sustaining the vital power. It is my solemn duty to protest against this practice on the strictest and purest scientific grounds. The action of alcohol, under such circumstances, is injurious all round. It excites the patient, and renders him or her nervous and restless. It relaxes the arteries, and favors the escape of blood through the divided structures. Entering the circulation in a diluted state, it acts after the manner of a salt in destroying the coagulating quality of the blood; and, above all other mischiefs, it increases the action of the heart, stimulating it to throw out more blood through the divided vessels. These are all serious mischiefs, but the last named is the worst. In hemorrhage the very key-stone of success lies so much in quietness of the circulation that actual failure of the heart, up to faintness, is an advantage, for it brings the blood at the bleeding-point to a stand-still, enables it to clot firmly, when it has that tendency, and forms the most effective possible check upon the flow from the vessels. DR. RICHARDSON (*Asclepiad*, No. 29, 1891), refers to a case in which three pounds of blood was lost and the patient was unconscious, but which recovered. He refers to this case as typical, because, if a stimulant were not wanted in it, a stimulant cannot be called for in examples less severe. The course followed was simply to lay the patient quite recumbent when signs of faintness supervened, and, so long as he could swallow, to feed him with warm milk and water freely. Such, in my opinion, is the proper treatment to be employed in every instance of syncope from loss of blood.—*Dietetic Gazette*, June, 1891.

TREATMENT OF FLATULENCE.

Flatulence is a trouble that sometimes defies medical treatment. A French journal recommends the following:

℞ Naphthol, ʒi;
Carbonate of magnesium, ʒi;
Powdered charcoal, ʒi;
Essence of peppermint, gtt. ii.

This is to be divided into fifteen powders, and one taken at the beginning of each meal.

When the flatulence is accompanied by constipation the following may be used:

℞ Magnesium sulphate, ʒi;
Flowers of sulphur, ʒi.

To be made into fifteen powders, one of which is to be taken at each meal.

When diarrhœa accompanies the flatulency:

℞ Bicarbonate of sodium, grs. xxx;
Prepared chalk, grs. xv;
Powdered nux vomica, grs. iii.

May be made into ten powders, one of which is given with each meal.

—*Pharmaceutical Record*, June 18, 1891.

THE CAUSE OF ANÆMIC HEART-MURMURS.

Anæmic heart-murmurs have been the subject of various ingenious explanations. The one given by the best text-books for a long time was a morbid condition of the blood, an explanation good as far as it went, but one that did not go very far. Recent investigations make it probable that these murmurs are due to a weakness of the papillary muscles of the heart, by which the curtains of the mitral and tricuspid valves are relaxed and so give rise to an adventitious sound. Experiments show that when in the death of an animal the heart gradually fails, the contraction of the papillary muscles lags more and more behind that of the ventricular wall, and ceases entirely some time before the rest of the heart stops beating. On account of their situation the papillary muscles are the part of the heart wall likely first to feel the effects of a decreased blood-supply in anæmia; corroborative evidence of this theory is found in the fact that in acute anæmia and other conditions of sudden and great weakness a heart-murmur is often to be detected, but disappear, upon compression of the iliac vessels or abdominal aorta, or upon the administration of alcohol or digitalis to strengthen the heart-beat.—*Northwestern Lancet*, June 15, 1891.

THE SECOND TRIENNIAL SESSION OF THE CONGRESS OF AMERICAN PHYSICIANS AND SURGEONS.

The Commitee of Arrangements takes great pleasure in announcing to the members and invited guests that the arrangements are sufficiently advanced to assure the success of the Second Triennial Session of the Congress of American Physicians and Surgeons, which will be held in Washington during the 22d, 23d, 24th, and 25th of September, 1891.

A number of distinguished physicians and surgeons from abroad have accepted the invitation to attend, among whom may be named Mr. Thomas Bryant, Mr. B. E. Broadhurst, Mr. A. E. Durham, Mr. Reginald Harrison, Surgeon-General Sir W. E. McKennin, Mr. U. Pritchard, Mr. F. Treves, Sir William MacCormac, and Drs. James G. Glover and William M. Ord, of London, England; Drs. McCall Anderson and W. T. Gairdner, of Glasgow; Mr. E. H. Bennett and Professor J. J. Cunningham, of Dublin; Professor John Chiene and Dr. J. Battey Tuke, of Edinburgh; Professor H. Krause and Dr. F. Beeby, of Berlin; Professor Curschmann, of Leipsic; Professor Hoffa, of Wurzburg; Professor Kuhne, of Heidelberg; M. Emil Juval, M. E. Landolt, and Dr. Pozzi, of Paris; Dr. A. Musso, Turin; Dr. Von Mozengeil, of Bonn; Dr. Lowenber, of Paris; and Dr. Rafail Lavista, of Mexico.

The sessions of the Congress will be held in the Main Hall of the Grand Army Building, 1412 and 1414 Pennsylvania Avenue, from 3 to 6 P.M. daily.

The President's address will be delivered in the Lecture Hall of the National Museum, Wednesday, September 23, at 8 P.M., followed by the reception of the President, from 9.30 till 12. Order of Executive Committee. The Army Medical Museum will be open the same evening.

The sessions of the Societies will be held according to the programmes of each, respectively, in the places as follows:

American Surgical Association, Main Hall, Grand Army Building, 1412 and 1414 Pennsylvania Avenue.

Association of American Physicians, Hall No. 1, Grand Army Building, 1412 and 1414 Pennsylvania Avenue.

American Climatological Association, Hall No. 2, Grand Army Building, 1412 and 1414 Pennsylvania Avenue.

American Gynæcological Society, Lecture Hall, Columbian University, Fifteenth and H Streets N. W.

American Laryngological Association, Parlor A, Arlington Hotel.

American Neurological Association, Parlors 182 and 183, Arlington Hotel.

American Orthopædic Association, New Reception-Room, Arlington Hotel.

American Otological Society, Ladies' Parlor, No. 1, Arlington Hotel.

American Ophthalmological Society, Ladies' Parlor, No. 2, Arlington Hotel.

American Physiological Society, Parlor 181, Arlington Hotel.

The officers of the American Dermatological Association and the American Association of Andrology and Syphilology have made their arrangements with the Shoreham for places of meeting.

Office of Registration, Parlors 1 and 2, Arlington Hotel. From this office the mail of members and guests will be distributed, and the city residence of each member or guest can be ascertained.

The Association of American Anatomists will meet in this city during the sessions of the Congress, and will occupy Hall No. 3, Grand Army Building. The American Pediatric Society will meet here September 23 and 24 in the Lecture Hall of Columbian University, Fifteenth and H Streets N. W.

The Congress will be composed of the members of the constituent Societies and invited guests.

A registration fee of five dollars will be required of every member of the constituent societies who may register; invited guests will not pay the fee. Order of Executive Committee.

Participating Societies can "accredit visitors to the Congress, who shall pay the registration fee, but shall not be privileged to participate in the deliberations of the Congress." Order of Executive Committee.

A copy of the Transactions of the Congress will be sent to each person who may register.

Only those who may register, invited guests, and ladies accompanying them will be admitted to the Reception of the President.

Secretaries of constituent Societies are requested to supply this Committee with the names and addresses of "accredited visitors."

The evenings of Tuesday, September 22, and Thursday, September 24, are left to the Societies.

Members of the American Surgical Association and of the Association of American Physicians will conjointly entertain their foreign guests at dinner at the Arlington Hotel, Thursday, September 24, at 8 P.M.

The American Gynæcological Society has also arranged for a dinner at the Arlington Hotel, Thursday evening, September 24. The American Pediatric Society give a dinner September 24.

Other Societies that intend to entertain their foreign guests are requested to communicate with this Committee.

Arrangements are in progress to secure reduction of railway fares. As soon as completed, the information will be communicated to each member and "accredited visitor."

The Arlington Hotel offers accommodations at the rate of four dollars per day, and the Hotel Arno offers rates "on the American plan, at three and four dollars per day; on the European plan, one dollar each per day. Exclusive use of bath, one dollar extra."

A blank certificate of registration will be sent to each member and "accredited visitor." The Committee requests each person receiving such certificate to fill the blanks and return it, with the fee, to Dr. John S. Billings, Treasurer of the Congress.

The American Pomological Society, and perhaps other Societies, will meet in this city, September 22 to 25. The Committee, therefore, suggest to the members an early arrangement for hotel accommodations.

Inquiries relating to railway fares must be addressed to Dr. S. S. Adams, 1632 K Street.

A complete roster of membership of the Congress has been prepared, with post-office address and Society to which each member belongs.

The Committee will take pleasure in answering any inquiry relating to the local arrangements of the Congress.

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—THE—

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Original Communications.

ON THE PREPARATION AND USE OF OINTMENTS IN DISEASES OF THE SKIN.

By L. Duncan Bulkley, A.M., M.D.*

THE application of ointments constitutes such a large element in the treatment of diseases of the skin, by the profession at large, that it has seemed desirable to present from experience a few words of caution and advice concerning their preparation and employment; for no one who has had much to do with dermatological practice can have failed to see harm, or, at least, want of success often resulting from the improper compounding or application of one or another of this class of remedies.

It must first be premised that, when speaking favorably later on of this or that ointment or method of local treatment, it is always to be understood that reference is only made to their value as far as relates to local treatment, the question of the appropriate dietetic, hygienic, and internal medicinal measures being left unconsidered; these latter, however, often, as is well known, are, in many instances, of far greater importance than the local medication employed.

It is also to be understood that in re

* Attending Physician to the New York Skin and Cancer Hospital, etc.

mending various ointments this is by no means to the exclusion of other topical measures, which are often of even much greater value than this class of substances in certain diseases of the skin; among these may be mentioned lotions, oily applications, powders, fixed dressings by means of plasters, collodion, gelatin preparations, etc. All of these have their use, and often are, each of them, the only really suitable application in particular diseased conditions.

But, as the subject of the local treatment of diseases of the skin is a very large one, I have limited the present consideration to that of ointments, in order, if possible, to present a clearer idea of their real value and use, and to rectify some of the errors which are occasionally met with in their employment.

Turning to the Pharmacopœia of the United States, we find about one dozen substances or compounds with which to prepare ointments, and under the heading of cerates and ointments almost fifty officinal combinations of these, with various remedies, are presented for our use. We will first comment upon some of the bases commonly employed for ointments, and then consider some of the combinations with remedies which have become officinal; and later will offer some practical applications regarding the employment of this class of applications in diseases of the skin.

First on the list comes *adeps preparatus*, or lard freed of its impurities by boiling with water. This forms a fair basis for ointments, but is not acceptable to many skins; also for many conditions it has not sufficient body to form the protective coating requisite; and, moreover, it is apt to become rancid, and thus even to prove a source of irritation, instead of soothing an already inflamed skin. To obviate this tendency to rancidity, the Pharmacopœia directs that it be benzoinated, by incorporating 2 parts of benzoin to the 100 of lard. This in a measure accomplishes the object desired, but is not always sufficient, as the decomposition will often take place in spite of this precaution. Moreover, the benzoin itself may prove somewhat irritating to delicate skins. It is better, therefore, not to trust to any artificial means for preserving the freshness of ointments, but to secure sweet and good material, and always to reject that which is at all old, or ointments which have been long prepared.

A word may be here added in regard to the very great importance of the matter which has just been mentioned,—namely, the absolute avoidance of the slightest rancidity in ointments, for it not infrequently has happened in my practice that an ointment which had before proved very acceptable was found, after it had been kept some time, to irritate the skin greatly. On examination a rancid odor was plainly detected, and when freshly prepared the same combination was again agreeable to the diseased surface. It may be here remarked that there is often this danger in prescribing many of the officinal ointments,—namely, that having been kept some time in stock, they have become rancid, and have thus become intensely irritating. Undoubtedly some of the failures seen to follow remedies or combinations ordinarily of service are due to rancidity of the excipient with which they are prepared. It is, better, therefore, to order the ointment to be freshly compounded of the strength desired, rather than to take that officinally prepared and kept in stock.

We find two preparations by the name of cerate, which are in some respects more valuable for ointments for most skin-affections than lard. The one, *ceratum simplex*, consisting of white wax 30 parts, and lard 70 parts; the other, *ceratum cetacei*, composed of spermaceti, 10 parts; white wax, 35 parts; and olive oil, 55 parts. To these should be added the *unguentum cetacei*, which is very like the latter, only somewhat softer, being composed of spermaceti, 20; white wax, 8; and olive oil, 64 parts. These all have considerable body, and when spread on the skin form a protective coating, more suitable for many conditions than lard alone; but the first mentioned, or simple cerate, is far too hard for easy application in most diseases of the skin.

We have next two substances known as glycerites,—the one, the *glyceritum amyli*, composed of starch 10 parts and glycerin 90 parts; and the other, *glyceritum vitelli*, with 4 parts of yolk of egg to 5 of glycerin. The glycerite of starch forms a good basis for ointments, when fatty substances are not well borne, or when it is desirable to remove the application frequently with water. Combined with oil of cade 25 parts, sapo viridis 15 parts, and glycerite of starch 60 parts, it makes a most valuable application in psoriasis, which can be well rubbed in at night and washed off completely in the morning. The glyceritum vitelli is little, if at all, used in dermatology, but should form a good application to the skin, possibly with the addition of spermaceti or wax to stiffen it.

The *oleum theobromæ* is the next basis men-

tioned in the Pharmacopœia. This is but little used ordinarily in compounding ointments, but is an ingredient of many of the advertised nostrums, and should not be neglected. It is particularly useful when added, in about a quarter part, to ointments for use on the hairy scalp, to give them a low melting-point, and to aid in forming a protective coating over the skin; when employed in too large a proportion, it will prove irritating to many skins.

Under the head of "Ointments" we find but two preparations in the Pharmacopœia,—the *unguentum simplex*, composed of lard 80 parts and yellow wax 20 parts; and the *unguentum aquæ rosæ*, of expressed almond oil 50 parts, spermaceti 10, white wax 10, and rose-water 30 parts. The unguentum simplex is a good combination, much better for general use than simple lard; but, on the other hand, it is often found to be too hard, and ointments made with it will often be difficult of application, and when made up some time, with other ingredients, will become too stiff for ready use; as ordinarily kept in the drug-stores, I have not infrequently found it to be quite rancid.

The best ointment of all, when fresh and properly made, is, in my judgment, the *unguentum aquæ rosæ*,—the cold cream of the Pharmacopœia,—and this is the one which I use, almost to the exclusion of all others, in my practice. But some judgment and skill is necessary in its preparation, for, unless very perfectly compounded, with prolonged rubbing together of the ingredients, the ointment will not be perfection; in summer also it will require rather a larger proportion of the spermaceti and white wax, in order to have the proper consistency for a perfect application. Very frequently, when the skin tends to be too dry, a portion of the water may be replaced by glycerin. Occasionally the odor of the rose-water is not agreeable to the patient, and simple distilled water may be used in its place. The water held in this ointment is undoubtedly an important element in its remarkable effects on the skin, for the *ceratum cetacei* and *unguentum cetacei* have quite a similar composition, but are by no means as agreeable to most skins.

When the various products of petroleum, known in the Pharmacopœia by the general name of *petrolatum*, were introduced, it was thought that they would furnish the best possible bases for ointments, and that they would rapidly supersede all other excipients; they were soft, cleanly, uniform in composition, and not liable to become rancid, and seemed to fulfil all possible indications for this branch of therapeusis. But if the experience of others is similar to mine, these preparations will never supplant those already mentioned and others of recognized value. While the petroleum preparations have their value in certain conditions, they have, in my hands, failed to give the satisfaction hoped for. They are by no means always agreeable and non-irritating to the skin; indeed, many individuals are found who cannot bear them on the skin at all. Most of them, vaseline particularly, have not body enough to form good ointments, although for simple inunction, as a lubricant, or for the application of carbolic acid to the skin as an antipruritic, vaseline serves the purpose very well. But practically I order very little of this class of preparations, either in private practice or in my public clinics.

Recently, when *lanolin*, and subsequently *agnine*, were presented to the profession, it was expected that this substance would replace other ingredients as an excipient for ointments. But, again, we have been disappointed, and lanolin forms but a very small portion of the base of ointments, with those especially occupied with diseases of the skin. It is too sticky, and not easy of application, and, moreover, it will often prove irritating to a delicate skin. While it was thought to afford a means for the more ready absorption of medicaments, more experience has shown it to be questionable if this is the case. Indeed, in some recent experiments by Brooke, it was shown that the substances incorporated with lanolin were the slowest in entering the system. Moreover, in a large proportion of instances, it is not desired to secure this effect from remedies used in ointments, they being employed more for protective purposes than to secure the penetration of the substance into the economy. Lanolin, however, is useful as an addition to certain ointments, in the proportion of about twenty per cent., to give an adhesive quality to them, thus securing a firmer and more adherent coating for affected parts.

We come now to speak of some of the officinal ointments of the Pharmacopœia, representing combinations of various substances in proportions supposed to be serviceable for various purposes. As the number of these is large,—nearly fifty,—it will not be possible in our present limits to comment on all, or even a large proportion of them; but the thought arises as to how or why some of them became officinal, for certainly very many of them

wholly unsuitable in the strength given for the conditions for which they are recommended.

Three groups of these combinations are formed,—cerates, ointments, and oleates.

There are six of the officinal cerates, none of which are of practical application in diseases of the skin. Two of them are of cantharides, with also an ointment of cantharides, all of which would only be of use when much diluted as a stimulant application for the hair. The most commonly used cerate is probably the *ceratum resinæ*, or basilicon ointment, a very stimulating application, which I have frequently seen do much harm when ordered for a delicate or inflamed skin. There are also a cerate and an ointment of the subacetate of lead, the former of which is too strong for common use, and the latter perhaps too weak.

There are some forty officinal ointments, very few of which can be prescribed, as they are with advantage in diseases of the skin. Thus, the carbolic acid ointment is made of a strength of ten per cent., which is far too strong for most skins; whereas, the tannin ointment, of the same strength, is too weak to be of real service. The belladonna ointment is also of the same strength, and is capable, if used at all freely, of producing serious constitutional effects. I have seen severe symptoms follow its use, three or four times diluted, when applied about the vulva to remove itching. Also the officinal ointment of chrysarobin is of the same strength, equal to forty-eight grains to the ounce, a far too great strength to be borne by most skins without excessive inflammatory effects.

Eight ointments are found containing preparations of mercury. Of these, the blue ointment, containing fifty per cent. of metallic mercury, is well known, and of great value; but for inunction on most skins it requires dilution by one-half, in order not to excite too much local irritation. The next mercurial ointment is that of the white precipitate, which is ten per cent., or forty-eight grains to the ounce. This is most commonly required to be two or three times diluted, even in psoriasis and seborrhœic eczema. The red iodide ointment, sixteen grains to the ounce, is of fair strength, but to be effective in lupus, or where its corrosive power is required, it should be employed much stronger.

Citrine ointment, one of the best known of the mercurial applications, is far too strong to be freely used, and I have repeatedly seen much harm follow when it was thus ordered in full strength. When diluted two to four times it often serves a good purpose in reducing infiltrations of the skin.

The ointments of the yellow and red oxide of mercury, each ten per cent., or forty-eight grains to the ounce, require to be very greatly diluted for use about the eyes, where they are commonly employed. The unguent hydrargyri subchloridi, of a strength of eighty grains of calomel to the ounce, is also much stronger than commonly employed. I rarely have occasion to prescribe over thirty grains in the ounce.

The single ointment of iodine is a good preparation, containing a trifle of iodide of potassium. A frequent prescription of mine, which is of great service in reducing glandular enlargements in syphilis, is a mixture of this ointment with the ordinary mercurial ointments, in equal parts. When well rubbed together, an ointment of the green iodide of mercury is made, which acts much more quickly than either of the ointments alone. For delicate skins this may require some dilution, but generally it is well borne, and at the Skin and Cancer Hospital it is kept in stock, and known and prescribed as the "double ointment," and is daily used as a parasiticide in ring-worm and favus of the scalp.

The unguentum picis liquidæ is an excellent remedy, composed of equal parts of tar and suet; but is far too strong for general use undiluted. When combined with oxide of zinc and rose ointment (℞ Ung. picis, ʒii; zinci oxidi, ʒss; ung. aquæ rosæ, ʒvi), it forms one of the most perfect applications known for a large share of cases of subacute eczema, both in children and adults. It is almost impossible for a part to itch when thickly covered with a layer of this spread on lint, and bound firmly on a part. It is the standard treatment for a large share of cases in my clinics at the Skin and Cancer Hospital and at the New York Hospital, and is prescribed daily in my private practice.

The ointments of the carbonate of lead and iodide of lead, each ten per cent., are also good combinations. The latter is certainly an excellent means for causing absorption of enlarged strumous glands. The stramonium ointment, containing ten per cent. of the extract of stramonium, is likewise a good application, and forms a most valuable base for combination with acetate of lead and opium in the treatment of external hemorrhoids.

There are four ointments containing sulphur, only one of which, the unguentum

sulphuris, with thirty per cent. of sublimed sulphur, is well known or much used. This is also too strong for direct application to most skins, as probably all have seen artificial dermatitis excited after its use for scabies. Diluted two or three times, with a little storax, and perhaps a little tar ointment, it forms an excellent treatment for scabies, although the more agreeable applications of naphthol and resorcin have largely taken its place in dermatological practice. The sulphuret of potassium ointment, and that of iodide of sulphur, each thirty grains to the ounce, seem superfluous, as I am not aware of their ever being used. The turpentine ointment, with equal parts of turpentine and an excipient, with some rosin, is a highly stimulating application, whose real utility seems very questionable.

The oxide of zinc ointment of our Pharmacopœia is a fairly good preparation, with a strength of twenty per cent. of zinc, or ninety-six grains to the ounce. This is stronger than I commonly employ it, and is made with benzoinated lard, which is not always agreeable to all skins. Moreover, as found in stock in the shops it is occasionally rancid, and I have frequently found it irritating, when a properly prescribed zinc ointment, in cold cream, freshly prepared, proved most grateful and healing.

The *unguentum diachyli* has been reserved to the last for comment, because of the very great importance of the subject, and because of its relation to the next group of substances, —the oleates. When properly made and fresh, diachylon ointment is one of the most valuable means of local therapy known for many diseases of the skin; but, as it is commonly furnished by the druggist, when no special effort has been made to have it correct, it is not only useless, but very commonly will be found to be decidedly harmful.

The Pharmacopœia directs that it shall be made by melting 60 parts of lead plaster with 39 of olive oil and 1 of the oil of lavender. The samples of the ointment ordinarily made in this way, which I have seen, have been tough, hard, and altogether inapplicable for spreading on lint or laying on a diseased surface; whereas, when made according to the original formula of Hebra, found in many books on diseases of the skin, and also given in the German Pharmacopœia, it is a soft, buttery ointment, easily spread, and of a delightfully soothing character to most skins.

The principles involved in the two preparations are quite different. In our officinal directions the hard, lead plaster is melted with forty per cent. of raw oil, which is not decomposed, but simply intermingles with the plaster, making it of a softer consistency. In the formula of Hebra the entire quantity of oil requisite to form a soft ointment is boiled with water, and as the litharge is sifted in, all of it decomposes, forming really an oleate of lead; and any one who will carefully compound the two preparations, each made according to the directions given, will see at once the greatly different result of the operations. It has also been proposed to make a diachylon ointment by melting the lead plaster with vaseline and cosmoline. The results from this are, however, also far from satisfactory, and much experience with trials of the diachylon ointment of the shops and that prepared correctly, as advised by Hebra, its main introducer, forces me to most earnestly urge that attention be given to this matter, both by those directly interested in the treatment of diseases of the skin, and also by those who shall have authority in revising our Pharmacopœia.

For many years certain combinations with oleic acid have been advised, under the name of oleates, and a number of remedies have been presented to us in this combination; but aside from the diachylon ointment, or oleate of lead, just referred to, but two have found place in our Pharmacopœia; these are the oleate of mercury and the oleate of veratrine. The former, which is officially ordered to be of the strength of ten per cent., is very useful, but occasionally requires dilution one-half for delicate skins, and a strength of twenty per cent. may often be required. The oleate of veratrine, of a two per cent. strength, may be of use, but I have never had occasion to employ it. Other oleates, recommended by Dr. Shoemaker and others, are those of aluminium, arsenic, bismuth, cadmium, copper, iron, manganese, nickel, silver, tin, and zinc, also those of quinine, strychnine, aconitine, atropine, and cocaine. I have had very little experience in the use of these, but have not been favorably impressed with the effect of those I have tried. The oleate of copper I have made use of on repeated occasions on parasitic scalp cases, but unfortunately with very indifferent results.

From this hasty review of some of the principal applications in the form of ointments furnished by the Pharmacopœia, it will be seen that in the line of dermatology there is room for improvement, and the Dispensatory

which describes these and their uses would hardly be a safe guide in the treatment of diseases of the skin. It is hoped that future compilers of this widely-used work will in future have more regard for this branch of medical practice.

A few words may now be added in regard to the actual preparation or compounding of ointments, a feature which continually requires the attention of the physician, if he would have success in the treatment of skin-diseases. While it is a great deal to have the right remedies prescribed, in their right proportions, it is almost equally important to see that the patient receives exactly that which was intended, and that it is prepared in the best manner possible. Attention has already been abundantly directed to the danger of having the least rancidity in the ointments applied to the skin. For this and other reasons to be mentioned, it is desirable for the physician to frequently inspect the ointments, or other preparations which are being employed, and to test them by smelling, feeling, rubbing on the skin, etc. A striking illustration of the need of this is found in connection with diachylon ointment, as already mentioned.

A great deal of harm is done sometimes by not having the ingredients of ointments finely enough pulverized and sufficiently well mixed with the excipient. I well remember once prescribing half a drachm of the ointment of the red oxide of mercury, which should contain three grains of the salt, to be rubbed with three drachms and a half of rose ointment, for an application to the eyelids. What was my astonishment the next day to find the patient with highly-inflamed eyes, and complaining bitterly of the severity of the treatment. Examining the ointment, I found it a brilliant red, and full of sandy red particles. On questioning the druggist, I found that he had taken half a drachm of the coarse mercurial salt (instead of the ointment), and simply mixed it with the amount of simple ointment ordered, thus making it ten times the desired strength. Moreover, there were large grains of the oxide of mercury, which stood out plainly in the ointment, and were gritty when rubbed between the fingers.

The metallic or other ingredients of an ointment should always be triturated most carefully in a mortar till an impalpable powder is formed. It is well then to add a few drops of sweet almond oil, making it a paste, which is then slowly incorporated with the greasy or other preparation ordered. I cannot leave this portion of the subject without again urgently advising that those who wish to attain the highest measure of success in treating diseases of the skin pay special and particular attention to the preparation of the ointments prescribed. Time spent by a physician in active work or observation, or study behind a prescribing-counter, is never wasted, and will often yield the highest reward.

There are many matters which could still be considered in connection with our subject, but this paper has already exceeded the limits desired, and a few words only will be added in regard to the employment and actual application of ointments.

In the first place, my observation leads me to remark that more harm is commonly done by too strong ointments than is usually supposed. The skin is a sensitive and irritable organ, and more often wants to be treated considerately and soothed into good action, than it does to be stimulated and irritated. It is well to begin with a mild preparation, increasing the strength as circumstances seem to demand; or, if a strong application is first given, let the patient understand what is expected or what may happen, and give directions for its dilution with cold cream or otherwise, if necessary.

It is also well to remember that the average patient, who has not heretofore been instructed, or who has not had special experience, knows nothing in regard to the best mode of application of an ointment, and if the highest degree of success is to attend the use of any particular remedy, it must be only by its proper employment. Careful directions should, therefore, always be given to patients exactly how to apply ointments, how frequently to make the application, when to change the dressings, and what to do with the part before and after applying the ointment; for my experience has shown me that, if it is possible to use it in a wrong way, the average patient will generally strike just that wrong way. As a corollary to this, it may be remarked that it is also well to question the patient later, and perhaps several times, to ascertain if the remedy has been used in exactly the right manner; for, as remarked before, a large share of the apparent want of success in this line of practice, by those who are not specially occupied in it, comes from a failure to have all the details of treatment rightly and carefully carried out.

The demand in dermatology is not so much for new drugs, applications, or methods of treatment, as it is for the diffused knowledge of what is already known to be of service, and the faithful carrying out of methods which experience and observation have proved to be useful.

The majority of patients will be inclined to apply ointments at night, and then to wash them well off in the morning. Now, in very many conditions, this procedure is absolutely fatal to any successful treatment, and it is readily seen that the application of a remedy for only one-third of the twenty-four hours can have very little effect, while the act of washing will sometimes more than counteract the benefit derived from the ointment. Therefore, whatever plan of treatment is desired must be explicitly and forcibly laid down and followed, and the matter not be left to the judgment or inclination of the patient.

Again, most patients will, on covered portions of the body, smear an ointment over the affected surface, and then wrap some linen or muslin loosely about the part. When examined shortly after, the wrap will be found to have absorbed the greasy base of the application, and the skin will be dry or covered with a thin layer of the mineral or other solid constituent of the ointment. Now, where it is desired to keep a part continually under the effect of an ointment, it should be soaked in it, if it were possible, as completely as though the part were immersed in a very large mass of the same ; but, as this is not possible, we have recourse to lint, and the ointment, which should always have considerable body, is spread to a very thick layer on the woolly side of the lint, and then firmly bound on the part.

An excellent illustration of the necessity for minute directions in regard to all these data is found in connection with eczema of the scrotum. When treated carelessly, or when the patient merely smears on an ointment, the disease will prove most distressing and rebellious ; but when, on the other hand, very minute directions are given, in regard to the sudden and brief application of hot water, once daily, at bedtime, and when then the part is quickly dried and enclosed in a piece of lint spread with the tar and zinc ointment, previously alluded to, covered by a suspensory bandage, the patient has complete relief, and with proper other treatment can surely be cured, and that with reasonable speed.

Time and space forbid my pursuing further this interesting subject of ointments and their application ; but I trust that enough has been said to direct some attention to the subject and that thereby some of us may get better results in our practice and some patients more relief from their sufferings.

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*THE PATHOLOGY AND TREATMENT OF PULMONARY PHTHISIS.**

By Heneage Gibbes, M.D.†

PULMONARY consumption has existed among men as far back as we have any historical record of disease. It is credited by Hirsch with about two-sevenths of all deaths, and lately has excited so much interest in the profession that I need offer no apology for making it the subject of my address.

I use the term pulmonary consumption to include those cases where progressive wasting of the body is associated with consolidation and the formation of cavities in the lungs.

In the earliest account of this disease we find it described as a suppuration of the lungs. Later on we find an account of large and small tubercles associated with suppuration and ulceration.

The word tubercle was first used to denote any small swelling or node, and as far back as 1700 we find Mangetus comparing the tubercles found in the lungs, liver, and spleen with millet-seeds.

We find various descriptions of this disease after this, and controversies arising as to whether all consolidations in the lungs were formed of tubercles. Two forms of tubercle were spoken of,—the miliary and tuberculous infiltration ; and we come to the time of Niemeyer, who considered that a large majority of cases of phthisis were inflammatory. This view was widely held until a comparatively recent period, and is still supported by high authorities.

At the beginning of the year 1882 the majority of clinicians of any standing firmly believed in the duality of phthisis.

In April of that year came the announcement that Dr. Robert Koch had discovered the bacillus of tuberculosis, and that inoculation with this organism invariably reproduced the disease in susceptible animals. Every one at once set to work examining sputum

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and recording the results of their observations. Watson Cheyne was sent by the Association for the Advancement of Scientific Research to Berlin to examine Koch's work, and, if possible, corroborate it. This he did, by going to Koch's laboratory, obtaining material from him and working by his methods, and getting results, which he published in the *Practitioner* for April, 1883, and his work is held in the latest editions of the English textbooks on pathology to be the corroboration of Dr. Koch's results.

The accepted position at the present time with a large majority of practitioners in this country is that wherever the bacillus tuberculosis is found there is tuberculosis, and it is this position which I propose to discuss in this address.

We are told that the tubercle bacillus is the virus of tuberculosis, and we therefore ought to be fully aware of the conditions under which it exists in disease, so that we may have some rational idea as to the treatment we should adopt in these cases.

Now comes the question, If we are going to investigate this disease, what morbid conditions shall we take as the basis on which to commence? Naturally, we should say, those in which cavities exist in the lungs; but we find that tubercle bacilli are found in cases where there are no cavities. We must, therefore, extend our base, and take in consolidations. Now, we find these existing, in a number of different conditions, in the old-fashioned pulmonary phthisis, in chronic tuberculosis, in acute miliary tuberculosis, in acute pneumonia, in the lesions of syphilis, and in hydatid disease, also in cancer and sarcoma. All these cause consolidation; but, to simplify matters, we will leave out all but pulmonary phthisis, chronic tuberculosis, and acute miliary tuberculosis. These three diseases are characterized by the formation of consolidations in the lungs, and in all of them tubercle bacilli are found. Therefore, with the prevailing view, these are all tuberculosis, and are all caused by the action of the tubercle bacillus of Koch.

To commence with pulmonary phthisis, as I understand it. This is a common result in a case of catarrhal or broncho-pneumonia, either in a weakly patient or where the disease is of unusual severity, and the consolidation is brought about most commonly in one of two ways. We will take for an example a delicate girl getting her feet wet and catching a cold. This passes into bronchitis, and the inflammatory process extending involves the small bronchioles. The case then becomes one of capillary bronchitis. When this stage is arrived at, two courses may be taken by the disease,—the inflammation may pass on from the bronchioles into the lung-substance, and develop into a case of catarrhal or broncho-pneumonia, or the products of inflammation may block up one or more of the small bronchioles by forming a plug in them, which is drawn farther in and more firmly fixed at each inspiratory effort, the result being that no more air can enter those lobules of the lung supplied by the plugged bronchioles. When this has taken place, the air imprisoned in these lobules soon becomes absorbed, and they pass into a state of collapse. Now, in any form of collapse of the lung, the greatest danger arises from the almost inevitable inflammatory action, which is at once set up in the air-vesicles in this collapsed condition.

We have, then, in these cases a portion of the lung consolidated either by direct extension of the inflammatory action, from the bronchioles or by the inflammatory action, set up by the collapsed condition, which is chiefly brought about by the inflammation in the bronchioles. Now, supposing that this delicate girl has not sufficient vitality to throw off this inflammatory process in her lungs, but that it is allowed to go on until the acuteness of the inflammation has destroyed the affected part and it has become devitalized.

We have, then, one or more portions of the lung in a necrosed condition. This dead tissue undergoes a further disintegration, and becomes softened and caseated, and this softened mass is expectorated through the bronchiole connected with it, leaving behind a cavity. This is an inflammatory process from the beginning to the end, and we are all aware how often the whole of this process takes place with great rapidity, and the wet feet result in the death of the patient. I do not think there is anything strained in this example, but that something of the kind must be familiar to you all. We will now inquire into the part played by the tubercle bacillus in this case, for it is in these cases that we find them in enormous numbers, large, long, and full of the so-called spores. We find the sputum loaded with them as soon as the consolidation begins to break down, and we find them in large numbers after death in those consolidations in the lungs which have not broken down, but only in that part of the consolidation which has undergone caseation. We do not find them in the bronchioles of cases of capillary bronchitis dying in that

condition. Now, where do they come in, in these cases, as the virus or causation of the disease?

We will now take chronic pulmonary tuberculosis. This is a condition with a totally different history. We have here a disease of insidious origin, with gradually-increasing weakness, anæmia, nocturnal cough, and irregular fever, and physical signs, at first very obscure at one apex, gradually increasing until marked consolidation is found, which then breaks down, and ends in the formation of a cavity. In the mean time the disease is steadily progressing in this lung, and a similar change is set up in the apex of the other organ. In the early stage, before there is any destruction of lung-tissue, we do not get tubercle bacilli in the sputum, but when the formation of a cavity begins we then find them. Their number varies, however, enormously, and in some few cases they are never found in the sputum during life or in the lungs after death, although these are full of cavities. Taking these widely-different conditions, and wishing to gain some idea of their character, we naturally make a microscopical examination of the two forms, and the microscope shows us that the morbid process is entirely different in the two cases. In the first we find a mass of inflammatory consolidation without a particle of structure. There has been no formation of new tissue, but the inflammatory action has been so intense that portions of the lungs have been destroyed and have undergone a process of disintegration.

In the second form, or chronic pulmonary tuberculosis, we find that the consolidation consists of new growth of a peculiar character, a fibroid tissue has formed from the connective tissue of the lungs, and among the fibres are a number of large multinucleated cells,—the giant cells. These are the tubercles. As they increase in size the centre of each gets its nutrition cut off, and becomes necrosed. Each consolidated mass, however, does not consist of one tubercle, but an aggregation of many in different stages of growth. In the periphery of a large tubercle a number of small ones will be found in the course of formation. Examining these tubercles for the bacillus, we do not find it in the necrosed centre, but isolated among the fibroid tissue, unless caseation or breaking down has taken place, when it generally is found in large numbers, but in some cases is absent altogether.

Passing on to acute miliary tuberculosis, we have another disease characterized by a rapid course, death often taking place, in children, within a fortnight of their being brought to the hospital, and which in some cases presents features which render its diagnosis from enteric fever extremely difficult. If we take a number of these cases and carefully compare them, we shall find a striking similarity in their duration, progress, and the appearances presented by the lungs after death, and tubercle bacilli are never found in the sputum.

When we make a microscopical examination of lungs studded throughout with miliary tubercles, we are surprised to find that they separate themselves into two different classes by the morbid changes existing in them. First, we find a certain number in which the so-called tubercles are merely small foci of inflammatory change, without any formation of new tissue, and all the nodules in these cases are of the same character; secondly, we find another lot of cases, in which the nodules are formed of reticular fibroid tissue with giant cells, and the larger ones have a necrosed centre; and we never find these two forms existing in the same lung. We next examine them for the tubercle bacillus, and we find that the first, or inflammatory form, invariably contain in the centre of each nodule a mass of tubercle bacilli, while the second form may contain none at all after extended search, or, if present, they are found simply among the reticular tissue and not in the necrosed centre.

Now, in pulmonary phthisis, I showed that the disease process was an acute one from the beginning, and the first, or inflammatory, form of acute miliary tuberculosis, or, as Hamilton calls it, disseminated catarrhal pneumonia, seems to me to be easily demonstrated as an inflammatory process also. We know that children expectorate but little. Therefore inflammatory products, in such a disease as capillary bronchitis, would accumulate in their bronchioles. A sudden fit of coughing would be sufficient to draw these inflammatory products into the lungs and distribute them throughout the air-vesicles; the presence of this inflammatory material would be sufficient to set up inflammation in those air-vesicles where it was deposited, without it having any inherent specific action. This process would go on from time to time, and we should find some inflammatory areas of large size, others only commencing, and this is just what we do find on examining the lungs from these cases with the microscope.

We have, therefore, two forms of consolidation in the lungs,—the one brought about by inflammatory action from first to last, the other by a new growth; and the tubercle bacilli are always found in the first when caseation has taken place, but are absent altogether in a few cases of the second form. In the face of these facts, which can all be verified at any time, where is the unity of phthisis, and how is it proved that the tubercle bacillus of Koch is the virus of either of these forms? According to him, in those processes where you find tubercle bacilli, there is true tuberculosis, no matter what the macroscopical or microscopical pathological picture is, or what the clinical evidence may show. This statement has always seemed to me to be too sweeping, and, in view of the different conditions and characters of the diseases in which it is found, I have not been able to accept this statement as true. There is another point, however, which must be considered in regard to the bacillus and its relation to tuberculosis,—namely, the effect produced by the inoculation of tubercular material, or pure cultures of tubercle bacilli into susceptible animals, we were told by Koch that the resulting lesion produced was histologically identical with tubercle as found in the human lung,—that is, reticular fibroid tubercle with giant cells.

This is incorrect, as the lesion produced is not at all similar to that found in the human lung, and also differs considerably, when the material used is taken from a case of pulmonary phthisis, from that produced by material from a case of chronic pulmonary tuberculosis.

There is another point yet to be considered, and one that seems to me to be a most important one, and that is the tuberculosis that we find occurring in cattle. There is a marked difference in the anatomical conditions in the lungs of a cow affected with this disease from anything we can find in the human being. And there is also a marked difference in the bacillus we find associated with it, and also in the conditions produced by the inoculations of susceptible animals. If we examine the lungs of a cow with tuberculosis, we always find large masses of calcification, so much so that it is often impossible to cut sections with the microtome without first decalcifying the organ. Now, this is a rare condition in the human lung. Next we find that the bacillus, although having the same color reaction as that found in the human lung, is much smaller,—at least one-third,—and on cultivation it presents some markedly different features.

The distribution of the bacilli is very different in the cow's lung to what it is in the human. In the cow's lung all the giant-cells contain a large number of bacilli, and the large epithelioid cells, which are very numerous, also contain them. In the human lung I have never been able to find a single bacillus in a giant-cell, and this has been the experience of many other observers. In Koch's original paper we were told that the giant-cells were the habitat of the bacilli, and this statement was repeated in the text-books, and in the last edition of Fraenkel's text-book of bacteriology I find the same statement made. This has a grave significance. It shows that the descriptions have been taken from bovine tuberculosis and not from human. Of course, with the view held by Koch, this was immaterial, and wherever the tubercle bacilli existed there was tuberculosis, but I have found such marked differences between the two forms that I am inclined to think them very widely separated, if not distinct diseases.

From what I have said, if the tubercle bacillus, as Koch affirms, is the virus of the disease, and tuberculosis is wherever this organism is found, it is, to say the least, a most remarkable thing that it should be capable of producing so many varied conditions,—in the one case supplementing the cold produced by wet feet, and causing a process of pure inflammation to result in destruction of the lung-tissue; in the other producing a chronic new growth from pre-existing tissue, which new growth is prone to break down, but which is, however, as distinct a neoplasm as any cancer.

The view that the bacillus is the virus of the disease has caused tuberculosis to be considered an infectious disease, and measures are taken to destroy sputum and isolate tubercular patients. If the bacillus is the virus of the disease, it is difficult to understand how any can escape infection, and the doctrine of immunity is called in to explain it; that is, a susceptible condition is required, without which no infection can take place. What this condition is no one knows, and it seems curious that inoculation with tuberculous material containing tubercle bacilli will invariably produce the so-called tuberculosis in guinea-pigs or monkeys, but will not produce it in human beings, as I have proved by inoculating myself with pus containing numerous tubercle bacilli, and also by the numerous inoculations that take place

from cuts in making post-mortem examinations.

Guinea-pigs are considered to be peculiarly susceptible to tuberculosis, but I have proved beyond a doubt that you cannot induce the disease in them in any other way than by actual introduction into their systems. I have kept healthy animals in cages with inoculated ones for months, over and over again, without their taking the disease.

We will now consider the case as it stands at the present time. Consolidations are found in the lungs which break down and form cavities. These consolidations were considered by such authorities as Niemeyer and others to be formed in different ways and to differ in their structure, and that this difference exists I am at any time prepared to demonstrate. The discovery of the tubercle bacilli, however, at once upset this, and the unity of phthisis was taken as an accepted fact, and everything called tuberculosis where the tubercle bacillus can be found. We have now, therefore, to accept this condition, that this bacillus can produce the bronchitis, catarrhal pneumonia, and pulmonary phthisis which destroy a delicate girl, who initiated the process by getting her feet wet, or in some other manner catching a cold ; or the chronic pulmonary tuberculosis coming on in an insidious manner with well-marked symptoms, and which lasts for years in some cases before it destroys the patient,—the one being an inflammatory process throughout, and in which the clinical signs of inflammation are well marked, the other being a growth of new tissue in the lungs, without inflammation from the beginning. This is shown by the earliest stages in the formation of tubercles in the lungs in acute miliary tuberculosis, which grow in those organs without producing the slightest sign of inflammatory action in the healthy tissue surrounding them. If the tubercle bacillus had not been found in both forms, there would be absolutely nothing to connect them in the present advanced condition of our knowledge of morbid histology. The bacillus being the accepted virus of the disease, it followed, as a matter of course, that the destruction of the virus must be the course to follow if we wished to cure the disease, and innumerable remedies were propounded for this purpose. Among these the hot-air treatment of Weigert. This was tried by a number of men, but proved a complete failure, and showed that its author was entirely ignorant of normal physiological conditions. The aim, however, was manifest,—it was to destroy the bacillus, the virus of the disease.

We now come to the publication of Koch's remedy for this disease, which he gave to the world last year. He stated in his description of his remedy, while keeping the composition of it a secret, that it did not destroy the tubercle bacilli, but the tuberculous tissue, and that this must be living, as it had no effect on dead tissue, such as necrotic cheesy masses. In the first instance, the living tuberculous tissue must be caused to undergo necrosis, and then everything must be done to remove the dead tissue as soon as possible, as, for instance, by surgical interference. This is Koch's statement, and hardly any one seemed to find anything at all outrageous in it. I think, however, there are several points of grave significance to be discerned. It must be remembered that it was the discovery of the tubercle bacillus by Koch, and the proof he gave that its inoculation into susceptible animals would reproduce the disease, that established its position as the virus of the disease, the action of a single bacillus being described resulting in the production of tuberculosis, and on this the unity of phthisis was also established and the views of Niemeyer discarded, except by those whose clinical experience was too great to allow them to do this.

Now, when the author of this great discovery, after an investigation extending over eight years, found a remedy for the disease, we naturally expected that its first and most vigorous action would be on the bacillus, which he himself had shown was the causation of that disease ; but no, we are calmly informed that it had no action whatever on the bacillus, but only on tuberculous tissue, and none whatever on necrotic cheesy masses, and this tuberculous tissue was to be first destroyed by the remedy and then got rid of by surgical interference.

Let us see what Koch's own description excludes from the action of his remedy. First of all, every case of inflammatory consolidation of the lungs, where there is no growth of tuberculous living tissue, but necrotic cheesy masses in which the presence of numerous tubercle bacilli, according to him, prove it to be tuberculosis.

Next all those cases of tuberculous growth in the substance of the lungs, which growth the remedy was to destroy but could not remove, as I do not think that, even with the advances made in scientific surgery, the surgeon is prepared to open the thoracic cavity of a patient and slice up the lungs to hunt

for tuberculous tissue hidden in their substance. This leaves lupus and tuberculous joints. On what evidence are these to be considered tuberculosis at all? because in a very few cases some tubercle bacilli have been detected. It is notorious that in numbers of so-called tuberculous joints no tubercle bacilli can be found, and in a paper on this subject lately published an attempt is made to show that these bacilli at certain stages of their growth will not take the special stain. This is a pure assumption, but on a par with the special pleading adopted by the same writer to bolster up Koch when his comma bacilli of cholera was shown to be merely a concomitant of the disease. This remedy of Koch has turned out a disastrous failure, and Dr. Cornet, who, a short time ago was charging twenty-five dollars for each inoculation, and seeing two hundred patients a day, and who built a large hospital at Charlottenburg for this treatment, has been obliged to close his hospital for want of patients. With regard to the composition of Koch's lymph, when he at last made a statement as to what it was, we were informed that it was a glycerin extract of pure cultures of tubercle bacilli, I imagine nearly every one was under the impression that these were bacilli derived in the first instance from the human lung. I do not think, however, that any one who has done much work in cultivating these bacilli could believe that the immense amount of lymph sent out from Koch's laboratory could have been derived from this source. These bacilli grow very slowly, and it is not an easy matter to get them to grow luxuriantly. With the bacilli from cows' lungs, however, it is different, as they grow readily, and in about five weeks the growth will cover an ordinary tube. Should it eventually be proved that bovine and human tuberculosis have important points of difference, it ought to be definitely stated whether the lymph sent out was all derived from human sources, and the future history of all inoculated cases should be carefully watched.

I may now state the views I hold on the pathology of this disease, which are based on continuous work extending over nearly ten years. In the first place, I am convinced that we must recognize two forms of disease which result in the formation of cavities in the lungs. And, secondly, we must admit that one of these,—pulmonary phthisis,—occurring after broncho-pneumonia, is a purely inflammatory disease from beginning to end. Thirdly, we must recognize two distinct lesions in the lungs in acute miliary tuberculosis, so marked as to constitute two separate diseases. Fourthly, after due consideration, I think we must admit that it is highly improbable that the tubercle bacillus can in one case set up an acute inflammation, resulting in breaking down and destruction of tissue, and in another case in the same organ cause a new growth of fibrous connective tissue without any inflammation whatever.

The whole question seems to resolve itself into the relation of the tubercle bacillus to the disease. Not very long ago it was considered rank heresy to doubt for one moment that Koch's bacillus was the virus of the disease. But what is the position that Koch himself has taken? in announcing his remedy he distinctly states that it will have no effect on the bacillus. It seems strange, to say the least of it, that a man who had discovered the cause of a disease, and, after years of work, had found a remedy, should bring out one that had no action whatever on the cause, but only on the result, and which left out those cases where the cause existed in the largest numbers,—namely, necrotic cheesy masses. No reticular tubercle ever becomes entirely changed into a cheesy mass; some fibroid tissue is always left at the edges. This statement of Koch, therefore, I take it, shows that he recognizes those lesions which are composed entirely of broken-down inflammatory material, and in consequence he cannot believe in the unity of phthisis, as these necrotic cheesy masses contain myriads of bacilli, giving the characteristic color reaction. It is a well-known fact that in any consolidation in the lungs, however small, where caseation has taken place, a number of different micro-organisms are found. They are all sharply differentiated from Koch's tubercle bacillus by their reaction to staining agents, as tubercle bacilli are alone able to hold the red color when subjected to the action of an acid. This peculiarity is in some way associated with caseation, and it seems evident that this reaction is closely related to certain fatty materials.

If any ordinary bacteria be cultivated on solid culture media, and a thin layer of butter be placed on them, so that they are covered with it, these bacteria will show the same reaction as the tubercle bacilli; that is, they will hold the red stain when passed through acid. The same thing may be brought about by adding fatty matter to the culture media, but so much fat is required to do this that the medium will not remain solid. Bacilli are

found in smegma which have precisely the same reaction as tubercle bacilli, but when they have been cultivated on gelatin for some little time they lose it entirely. I made this statement at the annual meeting of this Society three years ago, and it has been abundantly corroborated since then. We may, therefore, consider that the reaction characterizing Koch's tubercle bacilli may be acquired from the fatty material in the caseation, where it forms such abundant growth that it evidently finds suitable pabulum. Now, if its presence in the consolidation of broncho-pneumonia, which has gone on to pulmonary phthisis, can be satisfactorily explained, it seems to me there is no possible reason for including this disease under the head of tuberculosis. We know that the ultimate ends of our breathing apparatus—that is, the farthest point the inspired air can reach—are the air-vesicles, and we know that these are small sacs, composed of flattened epithelial cells, which are joined by cement-substance to one another, and have small holes in this cement-substance, which communicate with the lymph-spaces outside. We also know that particles of carbon or soot in the air we breathe pass into the air-sacs, and through these openings into the lymph-spaces outside, from whence they pass on to the lymphatic glands, which, in people who have lived in large cities, are made quite black by them. Exactly in the same way a micro-organism can pass into the air we breathe, get into the lymph-channels, and then pass on to the blood.

In the circulation it would be carried throughout the body, and in all probability numbers of micro-organisms, or rather their spores, get lodged in this manner in the various organs. As long as the organs or tissues are healthy they can do no harm, as their function in nature is to feed on devitalized organic matter and digest it, in doing which they split it into simpler forms, many of which have toxic properties. That the spores of micro-organisms do exist in normal blood has been proved by a number of investigations, where the blood was first carefully tested and found free from formed bacteria, but an hour after the injection into the circulation of sterilized material, capable of setting up a chemical change in the blood, it was found to be teeming with them. In the consolidation of broncho-pneumonia the spores of various forms must be present. None of them can grow until this consolidation has lost its vitality. After this they can, and their action would be that they would simply set to work and devour this devitalized consolidation, increasing enormously in number as they did so, having now developed into their adult condition; and by their action on the consolidation I think they bring it into a softened condition, in which it can be passed off by the air-passages, leaving a cavity behind. This seems to me to be a complete explanation of all the processes that take place in pulmonary phthisis, and the explanation also of the inflammatory form of acute miliary tuberculosis, or disseminated catarrhal pneumonia, as Hamilton named it before the discovery of the tubercle bacillus, in which disease there are always a large number of tubercle bacilli in the caseated areas. I think it is most important that we should realize the different stages of this disease, and how it differs from tuberculosis, as, if we have this knowledge, it is not a difficult matter to cure it if taken early enough.

We have an inflammatory condition of the lungs, and if we can only stop this inflammatory process before any portion of the lung has lost its vitality, we can bring it back to its original condition by adopting any means that will remove the inflammation and keep up the strength, especially of the respiratory muscles, and yet we sometimes see croton-oil blisters applied over the chest, entirely depriving the respiratory muscles of their action on the lungs beneath.

Tuberculosis is a much more formidable disease. It commences insidiously, and is often far advanced before its presence can be detected. Consisting, as it does, of a new growth of fibroid tissue derived from the connective tissue of the lungs, it is evident that a good deal of this new tissue may be formed before it can be detected by physical examination. It generally commences in the apex of the lungs, and grows downward. It has this peculiarity, that, after growing to a certain size, which varies according to the chronicity of the process, the centre undergoes a necrotic change and loses its vitality. Although one of these tubercular masses looks large to the naked eye, and appears to be homogeneous, it is in reality made up of an aggregation of tubercles, and this tubercular process is always progressing on the outside while the centre is breaking down. Little tubercles in the earliest stage can be found in the periphery. These tubercles can grow rapidly, as is shown in acute miliary tuberculosis, where the lungs are found filled from apex to base with them, in all stages, but of

small dimensions; also in tubercle of the choroid, where the growth is the same. Whatever the cause may be of this condition, it is something which must be carried throughout the lungs by the circulation in acute miliary tuberculosis, but which must have some other distribution in those more chronic forms where the apex is the first part affected.

Dr. Shurly and I have now been working together on this subject for three years, and we have gone most carefully into all the conditions found. Our investigations have resulted in the differentiation I have just stated, and also in causing us to consider the tubercle bacillus more as an accessory than an actual factor in the production of tuberculosis. My own view, that there was some morbid product responsible for the irritation resulting in this new-growth tubercle, was formed before I came to this country, and on my arrival here I was glad to find that Dr. Shurly, from work he had been doing in this direction, was also of the same opinion. We procured monkeys, and carefully studied the disease processes in them, and, having satisfied ourselves that we had a morbid chemical substance to deal with, we set to work to try to neutralize it. After numberless trials, we found that we could do this with iodoform, but that substance set up a fatty change in the liver, and had to be discarded. We afterwards found that iodine would prevent the formation of tubercle in inoculated animals, and that chloride of gold and sodium would render tubercle bacilli innocuous, without, however, killing them. This seemed to be the result we were aiming at, as we always considered that the so-called pure cultures of tubercle bacilli were not really pure, but, as in the case of the jequirity bacillus, contained some morbid product introduced from the original source. We made a large number of experiments on animals by inoculating them with tubercular material, leaving them for a week, and then putting them under treatment.

We used in the first place monkeys, but they were too expensive, as we required large numbers. Guinea-pigs were, fortunately, found to give exactly the same reaction, and they were afterwards used for all the ordinary experiments. We found that putting them under treatment a week after they had been inoculated with tubercular material confined the lesions to the sore at the seat of the inoculation.

We then tried putting healthy animals under our treatment for a week, and in some cases a fortnight, before inoculating them with tubercular material, and in these cases we prevented even the formation of an abscess at the seat of the inoculation.

We now considered that we were in a position to try our remedy on human patients, which we did with the most gratifying results. This investigation has been most thorough, and the results we have obtained were from a study of the disease in all its varying conditions. All animals have been most carefully examined during life and after death, and the results recorded, and when I state that over three hundred guinea-pigs and nearly one hundred monkeys have been used, besides a number of other animals, I think you will admit that we have not arrived at any hasty conclusions.

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*THE STATUS OF THE HYDROCHLORATE OF COCAINE IN MINOR SURGERY, AS BASED UPON THE EXPERIENCE OF PHILADELPHIA PHYSICIANS.**

By Lewis H. Adler, Jr., M.D.,† Philadelphia, Pa.

GENTLEMEN:—The subject which I bring before you this evening is one full of interest. It offers a field for study and investigation which is peculiarly attractive; for if, by the simple hypodermic puncture, we can inject a substance into certain portions of the human body, and thereby secure immunity from pain, or, at least, an alleviation from the sufferings of a minor surgical procedure sufficient to enable the patient to withstand the anguish of the same,—and no unpleasant symptoms or toxic effects be produced by such use of the drug,—we have at our command a remedy *par excellence* as a local anæsthetic.

Have we such a remedy in cocaine? I think so; and it is my object to prove this to be the case by quoting the opinions of a number of Philadelphia physicians respecting their experience with the drug.

Letters have been written to over fifty gentlemen of this city regarding their personal use of cocaine in minor surgery, with a request to make known their views as to its merits as a local anæsthetic and its range of utility in surgical practice. Replies have been received to fifty-one of these communications. Included in the list are the names of surgeons, gynæcologists, obstetricians, ophthalmologists, and

* Read in extract before the D. Hayes Agnew Surgical Society, March 6, 1891.

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throat and nose specialists. Certainly deductions drawn from the expressed opinions of such a large circle of practitioners of medicine must be accepted as correct and not open to dispute, representing, as they do, an extensive experience with cocaine, as well as a close and careful observation of its effects. Such being the case, allow me to present for your consideration extracts from these letters.

For convenience I have arranged the replies alphabetically.

1. Dr. D. Hayes Agnew writes: "Cocaine is very well adapted to many cases of minor surgery, such as the removal of foreign bodies from the surface of the eye; caruncles from the female urethra; in allaying the irritability of the urethra before passing sounds or bougies; in the ligation of small hemorrhoidal tumors; in the extirpation of small tumors from the mouth, and in operations on the nasal cavities; in the removal of small tumors on the surface of the body, particularly if, after the hypodermic injection of the drug, the circulation in the part can be interrupted.

"Extreme caution in the use of the agent is to be observed when the circulation cannot be controlled; especially is this the case when any considerable amount is required.

"These are some of the uses of cocaine, though by no means the range of its utility in minor surgery."

2. Dr. John Ashhurst, Jr., replied: "My experience with the drug as a local anæsthetic in minor operations has been quite favorable. I have found it very useful, applied hypodermically, in the removal of small tumors, moles, etc., and in the receiving ward of the Pennsylvania Hospital, this city, it is constantly employed in amputation of fingers."

3. Dr. B. F. Baer: "I have used cocaine but very little in my practice. Occasionally I find it of service in cases of hyperæsthesia of the vagina for purposes of examination. I do not perform any plastic operations upon the vagina under cocaine anæsthesia. Once, in a case of emergency, I performed an abdominal section with the drug as the anæsthetic."

4. Dr. J. M. Baldy: "In minor gynæcological operations cocaine has a field of usefulness. It is especially adapted to small operations, such as take but a few moments for their performance, and can be done in your office. For instance, in a highly inflamed and irritable urethra, in which it is desired to pass an instrument; in those cases where one wishes to remove vascular vegetations at the meatus urinarius; caruncles or hemorrhoids of the urethra.

"In the more serious and prolonged operations, such as dilatation of the urethra or os uteri, and in the cutting operations on the cervix and the perineum, I do not think that the local anæsthetic, cocaine, is so good as the general one, ether.

"It is true that many of these operations could be done under cocaine without pain to the patient, but there is a moral objection to its employment in these cases. When the drug is so used, the patient is continually on the watch for something to happen, and the nervous tension is, in a nervous woman, sometimes extremely exhausting. Again, the muscular system is not sufficiently relaxed to make the necessary manipulations easy, it being remembered in what a narrow limit of space the work must be done, even under the most favorable influences. In these cases cocaine anæsthesia, in my experience, has much prolonged the operation and rendered it more tedious.

"Another reason why I think a patient should be rendered oblivious to her surroundings in such instances is that a woman does not like the idea of having a number of men inspecting and manipulating her sexual organs. Therefore, as a matter of delicacy, both to her and the attending surgeon, it is well that she be completely anæsthetized.

"A combination of such reasons has induced me to discard in my practice local anæsthesia whenever I can employ ether."

5. Dr. George M. Boyd: "Applied locally to a serous or mucous membrane, or to any portion of the body where the skin is denuded, cocaine, in my experience, has never failed to produce its anæsthetic effect.

"I have amputated fingers under the local effect of the drug, the patients in the majority of cases experiencing no pain, although some apparently did.

"I have recently employed it in several cases of urethral caruncles with most satisfactory results.

"As an anæsthetic, I always feel uncertain as to how much I can depend upon it."

6. Dr. T. Hewson Bradford: "I have used cocaine but seldom, for, when an anæsthetic has been required, ether has been my preference."

7. Dr. J. Solis-Cohen: "I find hypodermic injections of cocaine amply sufficient for tracheotomies, laryngo-fissures, and the removal of cystic and other tumors exterior to the larynx. Injected beneath the mucous membrane, almost equally efficacious, and often fully so, in resection of tonsils and removals of portions of the palate, pharynx, etc., for epithelioma and

tuberculosis; also for removal of lymphoid growths from the vault of the pharynx, adenomas of the soft palate, and many cases of circumscribed nasal and pharyngeal neoplasms.

"Topically applied to the mucous membrane, it is of great service in operations of all kinds within the nasal passages in most instances; but in some, especially those requiring repeated operations, little by little, it actually increases the sensitiveness of the part.

"Some patients are particularly susceptible to prostration by cocaine. I find this usually overcome by a dose of whiskey and water *before* applying the drug. I have rarely seen collapse unless I have been silly enough to apply cocaine to a bleeding surface. I have reached the conclusion that it is injudicious to reapply the drug once an incision has been made into bleeding tissues."

8. Dr. John C. Da Costa: "Where the circulation can be controlled,—as by a ligature or rubber band, as around the finger,—cocaine is an admirable local anæsthetic.

"In the operation for circumcision I use cocaine, to the exclusion of other anæsthetics. Here the circulation can be controlled, and the drug seems to utterly abolish pain.

"In gynæcology the drug is uncertain in its effect. In the spring of 1886 I had a series of cases that could not bear any general anæsthetic. [Cases of operation on the perineum and cervix uteri.] Cocaine was used hypodermically, and the surface as denuded touched with a solution of it.

"In about one-third of the cases there was no pain experienced during operation; in about one-third of the cases there was a deadening of the pain, but not abolition of it.

"In the remaining third of the cases there was apparently no impression made from the use of the drug.

"In abdominal work, *before operation*, I do not see how it can be useful; but *after operation*, and given by the mouth, it is probably one of the best remedies we possess to control the nausea from ether, to tone up the heart, and to start the activity of the kidneys.*

"I have never seen any bad results follow the use of the drug."

9. Dr. G. G. Davis: "I have not had that unbounded faith in the capabilities of cocaine that some surgeons have displayed. In my experience it has only been of service in dealing with affections of the cornea and mucous surfaces, as ulcers, etc.

"I have on two occasions seen what might be thought to be marked depression following the use of cocaine,—once in a case where an exostosis was being removed from the nose, and another time when the drug was applied to an ulcer.

"For operations in the nasal cavities, I employ a ten per cent. solution of cocaine, a piece of absorbent cotton being wet therewith and applied to the part for about five minutes. For the cauterization of venereal sores, apply a piece of cotton, wet with a four per cent. solution, to the part for a few moments. In cases of hemorrhoids, fifteen grains of cocaine to an ounce of tannic acid ointment is found to be quite useful. In ophthalmic work, I use the drug quite sparingly, especially in the removal of foreign bodies, a single drop of a two or a four per cent. solution being sufficient.

"I am not in the habit of using cocaine hypodermically, as I prefer the primary stage of general anæsthesia for slight troubles, and complete anæsthesia for the more serious operations."

10. Dr. Harry C. Deaver: "In all minor surgical operations, where I am able to cut off the circulation by means of an elastic ligature, and in operations on the mucous surfaces,—as in internal urethrotomy,—I employ cocaine as a local anæsthetic.

"It is very satisfactory in anæsthetizing the tunica vaginalis, in the radical treatment of hydrocele by injections of the tincture of iodine.

"I find it very efficacious in circumcision and in finger amputations; undoubtedly, in these latter cases, it is the anæsthetic *par excellence*. I never have had any unpleasant symptoms follow its use."

11. Dr. John B. Deaver: "My experience with cocaine is confined to its use in the urethra, where I use it all the time, doing internal urethrotomies, etc., under its influence. I have never had any unpleasant effects from the use of the drug."

12. Dr. Thomas H. Fenton: "In ear cases, the use of strong and even of weak solutions of cocaine has, in my experience, been occasionally attended by marked systemic disturbance. A very important point, not usually noted, is that in cases of foreign bodies in the cornea, where cocaine is used, the operator, unless very skilful or very careful, is apt to remove more of the epithelium, and, indeed, of the substance of the cornea, than should be done.

"Since the introduction of the drug, and its general employment in cases of superficial operations on the eye, I have seen many cases in

* See paper by Dr. Da Costa, "Transactions of the Medical Society of Pennsylvania for 1887," pp. 113–115.

which the eye has been roughly handled, as it were, and where the reaction and actual tissue-changes were more extensive than I have observed at an earlier time. It can readily be seen that with the employment of a local anæsthetic of such power, dexterity is no longer at a premium. In my eye clinic I always direct my assistants to use only a minimum amount of the solution. Reaction is thus rendered more prompt, and the operator is less likely to impose prolonged manipulation upon tissues which are illy prepared to stand any but the most judicious treatment.

"In the ear one is apt also to do more than is perhaps allowable, with the result that the after-effect is often surprising to both surgeon and patient."

13. Dr. L. Webster Fox: "Cocaine is simply invaluable in ophthalmic surgery. Since its introduction I have used it in every operation known to my specialty, and I find that it takes the place of ether and of chloroform in all operations, excepting for enucleation of the eyeball and iridectomy for acute glaucoma.

"My explanation, why it renders an eye more sensitive to touch in acute glaucoma, is that, the eyeball being hard and congested (the internal pressure being so great as to prevent endosmotic action between the fluids), the cocaine remaining on the surface of the mucous lining of the eyeball acts as an irritant; hence, instead of relieving pain, it increases it.

"For enucleation, cocaine does not penetrate to the deeper tissues,—muscle attachments, etc. I have removed one eyeball under cocaine anæsthesia, but would not repeat the experiment. While the removal of the eyeball is not an extremely painful operation, its moral effect produces a serious shock to the nervous system; therefore, in such cases, ether is much to be preferred.

"For cataract extraction, iridotomy, strabismus, and tattooing the cornea, cocaine is the *ne plus ultra* of anæsthetics."

14. Dr. E. Baldwin Gleason: "It should be borne in mind that the mucous membrane of the respiratory organs, thin and vascular as it is, seems especially well adapted for osmosis and exosmosis, the absorption or transudation of either gases or fluids. Hence the constitutional effects of cocaine are much more quickly perceived when a small quantity of a weak solution of the drug is sprayed upon the nasal mucous membrane than when an equal amount is taken into the stomach. However, the absorption of cocaine is, in a certain sense, a self-limited process. When a strong solution is applied, a small quantity is absorbed, and produces an immediate contraction of the vessels; so that the mucous membrane becomes almost completely ensanguinated, after which absorption goes on very slowly. A weaker solution of cocaine produces contraction of the blood-vessels more slowly, and hence a larger amount of it is absorbed, and it penetrates the tissues to a greater depth. For this reason the application of a pledget of absorbent cotton, saturated with a twenty per cent. solution of cocaine, within the nose, will produce a more rapid but less deep and profound anæsthesia than when a four per cent. solution is used in a similar manner. For the same reason, a pledget of absorbent cotton, saturated with the stronger solution, will remain inside the nose a long time without producing constitutional effects, while an equal amount of the drug sprayed upon the entire nasal mucous membrane, in a weak solution, manifests its constitutional effects almost immediately.

"When applied to the nasal mucous membrane, a solution of cocaine not only produces local anæsthesia, but also contraction of the blood-vessels and shrinking of the so-called erectile tissue. It also diminishes secretion and the osmosis of fluids. Hence it has a therapeutic value in the treatment of nasal disease, as well as a use in nasal surgery as a local anæsthetic. In nasal hydrorrhœa, astringents increase rather than diminish the discharge; it may be, however, promptly checked by the application of a four per cent. solution of cocaine. In acute rhinitis, the discharge and the occlusion of the nasal chambers, by swelling of the turbinated bodies, is at once relieved by the application of a four per cent. solution of cocaine, and this effect of the drug may be kept up for several hours by spraying the parts with a four per cent. solution of analgesin, which, although it causes contraction of the blood-vessels and turbinated tissues in the same manner as cocaine, seems rather an irritant than a local anæsthetic. Hay fever may be treated by ordering the patient to wear constantly small pieces of fine-meshed sponge, saturated with a solution of cocaine, within the nostrils, which will not only relieve the stenosis and diminish the discharges, but will filter, as it were, the inspired air. Of course such treatment is simply palliative, but it gives great satisfaction to sufferers during the attacks of hay fever.

"The following points should be borne in mind when cocaine is used within the nose:

"1. Local anæsthesia is best and most safely secured, not by spraying the entire Schneiderian mucous membrane with a solution of cocai

but by applying the solution on absorbent cotton simply to the field of operation.

"2. Within certain limits weak solutions produce deeper and more profound anæsthesia than the stronger, but require a somewhat longer time to manifest their full effects, a four per cent. solution being probably the most satisfactory strength for obtaining local anæsthesia within the nose.

"3. Solutions of cocaine, when applied to inflamed mucous membranes, do not manifest their effects as quickly and completely as when no inflammation is present.

"4. Unless the effects of cocaine are maintained for a considerable time, by repeated applications of the drug, its use locally is followed by increased congestion and inflammation when inflammation is present already.

"5. When cocaine is used to produce a sedative effect and to diminish the discharge in acute rhinitis, but more especially in nasal hydrorrhœa and hay fever, it should be employed in solution rather than as a 'snuff,' made from cocaine crystals powdered with other substances, because the mechanical irritation of a powder tends to increase the existing inflammation and the discharge, and to counteract to that extent the effects of cocaine.

"6. When a solution of cocaine is used within the nasal chambers, care should be exercised to prevent its reaching the pharynx, where it quickly suppresses the discharges and produces a most annoying sensation of dryness, which the patient vainly tries to relieve by frequently swallowing saliva. Except as an application to the tonsils, cocaine is not well adapted for use as a therapeutic application within the pharynx.

"7. When it is necessary to prescribe a solution of cocaine for a patient to use himself within the nose, some precautions should be adopted to prevent him forming the cocaine habit. It is well not to inform him of the name and nature of the drug given. The morphine habit has been established by frequently sniffing a solution of the drug into the nose, for the relief of pain, 'catarrh,' etc., and in such cases a solution of cocaine gives so much greater relief from the local symptoms and so great a feeling of buoyancy, not only by the constitutional effects of the drug, but also by the dilated nostrils supplying an increased amount of oxygen, that the habit of applying cocaine solutions inside the nose is soon established and only with great difficulty abandoned."

15. Dr. William Goodell: "I have been disappointed so frequently in the results of cocaine anæsthesia that I now never use it in gynæcological operations."

16. Dr. W. F. Haehnlen: "My experience with the use of cocaine has been principally confined to gynæcological and to obstetrical practice, although I have used it in the various minor operations of general surgery and with moderately good results, provided strong solutions were employed. By strong, I mean five, eight, and ten per cent. solutions. The two and four per cent. solutions have, in my hands, given very little satisfaction.

"The gynæcological cases in which the drug is indicated are those of beginning cystic degeneration of the cervix uteri, where evacuation of the cysts causes pain. If the vaginal cervix in such cases be thoroughly painted with a ten per cent. solution, the cysts may be punctured without the slightest pain. Again, operations upon the vaginal walls for prolapse, cystocele, and rectocele may be fairly well done under the influence of cocaine; but, of course, not so satisfactorily as with complete anæsthesia under ether; but where patients will not consent to taking ether or chloroform, or, where those drugs are contraindicated, cocaine plays an important *rôle* as an anæsthetic. For the treatment of urethral caruncle I can speak very favorably of strong cocaine applications, having had the happiest effects in such cases, whether cauterization or excision of the same was done. For the removal of painful *caruncul*æ *myrtiformes*, cocaine, liberally applied, renders the offending bodies anæsthetic.

"For the gynæcological examination of highly nervous and hyperæsthetic women, I have found the application of the drug to the vaginal orifice to be of service, especially where the speculum has to be used. In short, many of the various gynæcological manipulations, consequent upon diagnosis and treatment, may be rendered easier and less objectionable to the patient when cocaine is applied.

"In obstetrical practice I have found cocaine of considerable service, but its range of application therein is very much more limited than in gynæcology.

"The points I would lay stress on are the strength of the solution used and the condition of the parts to which it is applied, for unless the tissues intended to be anæsthetized be in such a state that the peripheral nerves may be reached by the drug, the effect is scarcely perceptible. Cicatrices constitute an example of a condition in which cocaine is inefficient."

17. Dr. Richard H. Harte: "On the whole my results with cocaine have not been so satisfactory as many of its advocates in their claims

for the drug had led me to anticipate, except on mucous surfaces, where it may be employed with considerable advantage. As to injecting it hypodermically for its local action, I think its use is always fraught with danger, owing to the unusual idiosyncrasy of some persons to succumb to its toxic effects. To my mind the only portion of the body where it should be thus employed is where the entire circulation can be cut off, and, when restored, the hemorrhage is sufficient to wash out any excess of the drug, and thus prevent its absorption."

18. Dr. A. Hewson: "I have used cocaine with great advantage in minor surgery. In cases of phimosis, I have removed the redundant foreskin without the slightest pain to the patient and with no interference in the after-result. My method of procedure in such cases is to constrict the root of the penis by means of an elastic ligature. Forty minims of a four per cent. solution of cocaine are injected subcutaneously into the foreskin. In a few moments the incision may be made without pain to the patient. Before coaptating the skin and mucous membrane, the ligature is removed, and free bleeding encouraged for a short while, in order to get rid of as much of the cocaine as possible. In less time than a week the union of the part is complete.

"I have used cocaine also with marked good effect in hyperæsthetic urethræ, with an existing stricture or strictures, to relieve the pain in introducing a sound or bougie. Also, after making deep urethral applications of ten or twenty per cent. solutions of argentic nitrate to granulating points, I have found cocaine to answer a double purpose,—of neutralizing the effect of the silver and in relieving the pain produced. Cocaine has failed in my hands in operations on fistula *in ano* to give the result expected. In amputation of fingers and phalanges I have had very good results, but in all such cases emphasis must be laid upon the use of the *elastic ligature* before the hypodermic injection is made, and upon the danger in the administration of the drug when such cannot be done.

"In all cases I use either a four or a six per cent. solution of cocaine, of which solution I use from forty to eighty minims, according to the character and duration of the operation."

19. Dr. Albert G. Heyl: "The power possessed by cocaine of obtunding not only the neural epithelium, but probably also the conducting tubules of the sensory nerves, has made it a very important adjuvant for the ophthalmic surgeon.

"The sclero-corneal epithelial covering of the eyeball is an exquisitely sensitive organ, and as it is a very common locality for the lodgement of foreign bodies, cocaine instillations are of the greatest service, enabling the operator to pick at will with the needle. So, also, when it is desirable to scarify the circumcorneal vessels,—as in certain cases of pannus,—cocaine is very useful.

"In tenotomy of the recti muscles, as for squint, I have known it to be employed, obviating the employment of ether, and with very little, if any, pain. The use of the drug in such cases enables the surgeon to gauge the immediate effect of the operation, which may be of considerable importance, as bearing upon the success of the same. In enucleation of the eyeball, where the patient does not easily come under the influence of the general anæsthetic, or when it is desirable to shorten the duration of the operation, the instillation of cocaine solution enables one to begin the same earlier than would otherwise be possible, and there surely is no reason why the drug should not be always used in enucleations of the ball, with this object in view. In cataract extraction, I have always used cocaine unwillingly. In the first place, because I have known in the practice of others destructive inflammation of the eyeball to follow its use, and while it may be true that, had proper antiseptic precautions been used, no inflammation would have occurred, yet the thought clings to me that an agent which acts as cocaine upon the cornea may make the eye more liable to mycotic infection than it otherwise would be; in the second place, it has seemed to me that when any difficulty is experienced in the expulsion of the lens the previous use of cocaine enhances it. This is because of the drug's action on the tension of the eyeball.

"As a remedy in the pain of inflammation it is too fugacious to be of value. One more experience may be added. Every one who has used cocaine instillations in the eye may have noted the flaccid condition of the cornea which follows. It may be dimpled by slight pressure of the needle. This phenomenon may be analogous to the shrinkage of the turbinated erectile tissue from the application of cocaine, a fact of practical value in operations in the nasal cavities; and some time since, noticing one of our hospital residents endeavoring to reduce a paraphimosis, I ventured to suggest that cocaine solution be sprinkled over the glans penis. This was done, and the reduction easily accomplished."

20. Dr. B. C. Hirst: "I use cocaine but very little. I tried it as a local anæsthetic

during labor for a while, but have not employed it for that purpose for some time. I also used it several times in opening mammary abscesses, but it is not nearly so satisfactory as ether, which I now always prefer. At present I employ cocaine only in the primary repair of the perineum, and not always then, for the parts are benumbed by pressure and less sensitive than usual. When I use it in this way I place a pledget of cotton, wrung out in a solution (from four to ten per cent.), in the wound, while I prepare the needle and the thread."

21. Dr. E. W. Holmes: "Cocaine does not produce its effect through the unbroken skin; it there has to be used hypodermically, in which case the puncture of the needle gives almost as much pain as that of a bistoury. While its anæsthetic properties have been amply confirmed, cocaine has not attained the practical utility expected of it, excepting in mouth, nose, throat, and eye operations, in which cases it is available both for operative purposes and for examinations. Even upon mucous surfaces it acts slowly, and some dissatisfaction is at times experienced because the operator has not appreciated this fact; for instance, I have found that it took ten minutes to thoroughly benumb a tonsil."

22. Dr. William Barton Hopkins: "I have found the anæsthetic properties of cocaine satisfactory as applied to mucous membranes; unsatisfactory as applied to the unbroken skin. Its effects are too superficial to be of value. It will not, in my experience, prevent or much relieve pain incident to the incision of deep abscesses, anal fistulas, or small growths; indeed, I seldom use it now except, of course, in operations on the eye, and for its therapeutic value in certain afflictions of the mucous membranes."

23. Dr. W. W. Keen: "I have very freely used cocaine in minor surgical practice, and have never had the least trouble with it. In two or three instances it has not seemed to diminish the pain, whether because I did not wait long enough or because of some peculiar idiosyncrasy, which seems unlikely, I do not know. I have always used it in a four per cent. solution. The cases in which I have used it have been various instrumental processes in the male and the female bladder, for the extirpation of warts, ingrowing toe-nails, small tumors, epithelioma of the lip, nasal polyps, tonsillotomy, etc. In all such cases it is quite a routine practice with me."

24. Dr. Edward Martin: "Leaving aside its medical uses and its application to surgical procedures about the mouth and naso-pharynx, I have frequently employed cocaine as a local anæsthetic in cases falling under the following heads:

"1. Circumcision.

"2. Excision of small tumors.

"3. Avulsion of nails.

"4. Meatotomy.

"5. Passage of sounds when the urethra is unusually sensitive.

"6. Minor operations about the rectum.

"The circumcision can be rendered absolutely painless by injecting twenty drops of a four per cent. solution along the line of section. About the frænum the sensitiveness is greatest, hence several drops of the solution should be injected here. The needle is entered a quarter of an inch, and a drop or two is injected. It is then entered deeper in the proposed line of cutting, and a further injection is made, till one side is entirely anæsthetized; then the other side is treated in a similar manner. A rubber band should be placed around the root of the penis immediately after the injection is completed. After the stitches are passed, but before they are tied, this band should be removed, and free bleeding should be encouraged, that as much of the drug as possible may be carried out of the system.

"In removing ingrowing nails, the injection is carried in along the matrix, and is deposited, a drop at a time, as the hypodermic needle is slowly inserted, in order to anæsthetize the tissues in front of the needle before it is thrust in more deeply. Meatotomy is rendered entirely painless by the application for two minutes of a pledget of cotton dipped in a twenty per cent. cocaine solution.

"For the passage of sounds, not more than a grain and a half of cocaine should be used, preferably in a four per cent. solution. This should not be kept in the urethra more than two minutes.

"In rectal operations I employ a twenty per cent. solution, applying it sparingly by means of cotton pledgets.

"In all operations, such as are mentioned above, the anæsthesia produced is absolutely satisfactory, and, except in cases of marked idiosyncrasy, the danger of toxic effects is exceedingly slight. The first insertion of the hypodermic needle is, in inflamed regions, sometimes painful. It is stated that this may be avoided by soaking the positive sponge electrode of an ordinary faradic battery with a ten per cent. solution of cocaine and applying it to the skin to be anæsthetized, the negative elec-

trode being applied to any indefinite surface. With this method I have no experience."

25. Dr. J. Ewing Mears: "My experience with cocaine has been favorable. I have used it in operations upon the mouth, nose, vagina, and urethra, and in all instances I have derived beneficial results more or less marked. As a rule, I employ a four per cent. solution, and I have never met with untoward effects."

26. Dr. Thomas G. Morton: "Although I have used cocaine very extensively, yet I find at this time the range of its practical utility is less than formerly. The injection of the drug into the urethra is attended with so great danger that I have long since abandoned its use in operations upon this locality. I never now inject it subcutaneously for similar reasons. In ophthalmic surgery it would be very difficult, if not impossible, to get along without it. In the extraction of cataract, tendon section, removal of growths and foreign bodies, and in other minor operations upon the eye, it is invaluable. The same may be said in regard to many aural and nasal operations.

"In exploration of the larynx and in operations in this locality, cocaine is indispensable. In operations about the anus, such as fissure, hemorrhoids, and fistula, cocaine has not proved satisfactory. After iliac colotomy, the drug acts most satisfactorily in the early dressings, when more or less manipulation of the exposed bowel is necessary.

"In painful ulceration of the skin or the mucous membrane, cocaine often serves an admirable purpose. I am also partial to its use in painful conditions of the fingers and toes, as found in certain forms of diabetes. I seldom employ a greater strength of the drug than a ten per cent. solution."

27. Dr. Thomas S. K. Morton: "My employment of cocaine has not been very extensive. This is accounted for in part by what I regard as the limitations of its application; and, again, by its acknowledged dangers in overdose and in certain susceptible persons. Its use is practically limited to adults, and then only to such portions of the body where but a small quantity need be injected to secure anæsthesia, and where the circulation, both vascular and lymphatic, can be temporarily arrested. Thus, in minor operations upon the smallest locomotor extremities,—the eyelids and the penis,—it certainly has a field of usefulness in those persons who are not extremely nervous. Within these limits I have used the drug with satisfaction; but, from a surgical stand-point, I should always prefer general anæsthesia, because of the more thorough work that can be done, as the patient is then entirely under control. Again, unexpected complications often cannot be properly dealt with when operating under local anæsthesia. In operations requiring but a superficial incision, or thrust or two, I find freezing with rhigolene spray, ether, or ice much more efficacious and readily applied.

"I have noted in my own practice, and in that of many others, that it is the almost unexceptional rule for wounds to pursue an aseptic and satisfactory course when general anæsthesia has been employed; but that there are many exceptions to this course when either nitrous oxide, cocaine, or freezing mixtures are depended upon to wholly or in part annul the pain.

"The history of the drug in the hospitals of this city has been such as to prove it to be a dangerous agent in certain cases. Thus, I should not think of using it in any but the most superficial cavities, or in a urethra, where the possibility of fistula, false passage, or rupture existed. It must ever be used with caution and in very limited amount. The number of persons who are dangerously susceptible to its toxic influence I believe to be much larger than is generally conceded.

"Of course, in what has been written, I do not refer to superficial mucous membrane anæsthesia with cocaine. In eye work, its field of usefulness is almost unlimited; so, also, but in a less degree, in the nose, ear, and upon superficial surfaces, mucous or otherwise, prior to making painful applications or to scarification. But, where it must be injected into the tissues or a cavity, we should ever regard its use as not free from every serious danger."

28. Dr. E. E. Montgomery: "My experience with cocaine as an anæsthetic has been extremely limited. I have used it somewhat in operations upon the vagina and the cervix uteri, and in those cases in which it has been so employed it has been very satisfactory; they are not, however, of sufficient importance to justify a special report thereof."

29. Dr. Thomas R. Neilson: "My experience with the hydrochlorate of cocaine as a local anæsthetic lies chiefly in urethral work. I have very frequently injected a small amount of a four per cent. solution of the drug into the urethra before exploring it, when the patient was nervous or the canal hypersensitive. I very often use cocaine in solution when about to divide the meatus urinarius,—a procedure frequently necessary. My usual plan here is to secure on a match-stick a small pledget of absorbent cotton, and, having soaked the latter with

the solution, to insert it into the meatus, at the same time placing another small dossil of cotton, wet with the cocaine, upon the extremity of the glans penis. The anæsthesia produced has invariably been satisfactory.

"In the operation of internal urethrotomy upon strictures situated in the pendulous portion of the urethra, I have occasionally used cocaine, and mostly with satisfaction. I think, however, that care should be taken to inject into the urethra only a moderate amount of the solution, and that it should never be used when the stricture, which it is proposed to divide, is situated behind the peno-scrotal curve.

"In the hypodermic use of cocaine upon the male genital organs I have had two unfortunate experiences. The first was in a patient suffering from phthisis, in so advanced a stage as to preclude the use of ether anæsthesia, and upon whom it was necessary to operate for the relief of urinary fistulæ and abscesses in the scrotum, resulting from a stricture. There was also present adherent prepuce and 'pin-hole' meatus. The injections were made at a number of points in the scrotum where the fistulæ were to be laid open and in the prepuce along the line where I proposed dividing it. Altogether between forty and sixty minims of a five per cent. solution were injected, and in a moment toxic symptoms were manifested. These were not very intense, but still were sufficient to make me very anxious for a few moments. The second case was that of a gentleman upon whom I performed circumcision with anæsthesia produced by the injection of cocaine into the prepuce. The penis was tightly constricted with an elastic cord, and the points of injection were carefully made at the distal side of the line of circumcision. The amount injected was forty-five minims of a four per cent. solution. Toxic symptoms of a very alarming character were produced in the patient, coming on at the conclusion of the operation,—that is, a few minutes after the injections were made and after the elastic ligature was removed. Reports of these cases will be found in the *University Medical Magazine* for November, 1888, and August, 1889, respectively.

"Outside of operations upon the genitalia, my experience with cocaine is not very extensive, but I have used it sufficiently often to enable me to say that I consider it available in operations of a minor character, where the part in question can be thoroughly constricted at the proximal side of the injections. The region of the anus and the genital organs seem to be especially dangerous for the hypodermic use of cocaine. Their rich lymphatic and vascular supply doubtless accounts for this.

"My experience with cocaine anæsthesia upon the mucous membranes, where I have repeatedly employed it, has been uniformly satisfactory."

30. Dr. Charles P. Noble: "I have found the hydrochlorate of cocaine a reliable and useful drug in a limited field of application. It is specially useful, administered hypodermically (grain one-half), to produce anæsthesia, for the removal of small tumors, especially sebaceous and fatty growths. I have used it to stop toothache, in the removal of stitches from the vagina or other mucous surface, and to lessen the sensibility of the vagina prior to examination. In short, whenever it is desirable to anæsthetize a limited area for a short time, cocaine can be relied upon as the anæsthetic. When a part is inflamed, and the anæsthetic action of cocaine is not so marked, and when the circulation is active and cannot be confined, its action is evanescent."

31. Dr. Richard C. Norris: "I have not had a very extensive experience with cocaine. In four cases of abscess of the vulvo-vaginal gland, about fifteen or twenty minims of a four per cent. solution of the drug made lancing painless. I have used stronger solutions (five or ten per cent.), applied on cotton, in stitching the primary laceration of the perineum. In two of six cases, of which I have kept a record, the application of the cocaine had but little effect. Twice I have used a four per cent. solution in cases of ingrowing toe-nails, and have been enabled to relieve the pain of elevating and cutting the same. I have combined the drug in the strength of thirty grains to the ounce, with salicylic acid, in an ointment to be used as a corn solvent, and it only had a slight effect in relieving the pain. I have injected ten minims of a five per cent. solution into the prepuce before circumcision in three cases, and the only pain complained of was that produced by the introduction of the sutures. I have frequently used a four per cent. solution of cocaine on cotton, in contact with venereal sores for a few minutes before cauterizing with the stick of silver nitrate or nitric acid, and have made the same application to venereal warts before excising them,—always with good results."

32. Dr. Charles A. Oliver: "My experience with cocaine may be expressed as follows:

"1. That it has been of the utmost benefit in many diseases and injuries of the external eye, where nerves have been exposed or irri-

tated. Thus it has proved of inestimable good in scratches of the corneal epithelium or of the conjunctiva, and in superficial ulcerations and nerve irritations of that organ.

"2. That it has been useful where it has become obligatory to employ any instruments of fixation or of precision during the necessary handling of timid or restless patients with irritable and painful eyes.

"3. That it has been of great value in preventing the immediate pain caused by the application of cauterizing agents and strong astringents.

"4. That it has been of the utmost service in the various surgical operations upon those parts of the eye which can be readily reached by the drug.

"Personally, I have never employed it intraocularly during operations upon the iris or the deeper structures of the globe, neither have I used it during enucleation, or in the graver and more prolonged operative procedures upon the tissues of the orbit, preferring to omit the injection of an uncertain foreign material into the eye in the first variety of cases, and making use of a general anæsthetic in the second class of cases.

"I have never had any constitutional manifestations of the drug, although I have used varying strengths (two per cent., four per cent., eight per cent., sixteen per cent.) quite freely about the eye. I prefer small quantities of fresh aqueous solutions of the hydrochlorate to be frequently made without the addition of any antiseptic, as such solutions never seem to irritate or cause any unpleasant local effects whenever used in the proper class of cases."

33. Dr. William H. Parish: "I have used cocaine in a number of minor operations chiefly pertaining to gynæcology. When relief from the pain of an operation follows the obtunding of the cutaneous or mucous nerves, cocaine is of especial value. Cocaine applied to any surface will not prevent the pain following incision or pressure that reaches the deeper tissues. The drug is of no practical value in the relief of the pain attending labor. In minor surgery it is more agreeable to the patient, and usually of less annoyance to the operator, to administer a general anæsthetic.

"The hypodermic use of cocaine, preliminary to an operation, is objected to by patients, and occupies more of the time of the operator than is the case with the administration of ether, and when it is so employed it is not always attended with complete prevention of pain, yet, when ether is contraindicated, cocaine becomes of great service.

"I have found the drug of decided value in overcoming temporarily the hyperæsthesia of the female genitals, as in vaginismus, permitting, under such circumstances, examination and treatment in my office, when etherization would be objected to by the patient, and its administration would be inconvenient to myself."

34. Dr. Theophilus Parvin: "In minor surgical practice I have used a solution of cocaine (usually eight per cent.), locally applied, in the excision of urethral caruncles and of prolapsed urethral mucous membrane. I have also used the drug before dilatation in vaginismus and in narrowed cervical canal. In the first three instances, the result has been most satisfactory; but in the last one its anæsthetic effect has been only of doubtful advantage."

35. Dr. Chas. B. Penrose: "Several years ago I used cocaine a good deal in minor surgery. My experience with it was not favorable, and now I very rarely use it."

36. Dr. W. G. Porter: "In regard to the use of cocaine, I would say that applied on mucous surfaces, I consider it the best local anæsthetic we possess. Of course, when applied to the sound skin, it has no effect; but, by gently scraping the epidermis, as we would for a vaccination, we can obtain its anæsthetic effect as well as on a mucbus surface. Its use is not unattended by danger, as many fatal cases demonstrate. With its hypodermic use for surgical operations, I have had no experience; but on mucous surfaces, and in the extirpation of soft growths uncovered by skin, preparatory to the use of Volkmann's spoon, caustic, or the knife, I have had very satisfactory results with the drug."

37. Dr. B. Alex. Randall: "I have used cocaine with much, but not entire, satisfaction, since its value and limitations vary with the individual as well as the circumstances. Its ophthalmic use should be very cautious, the lids being kept closed after it is instilled to avoid drying of the epithelium; for it surely reduces the vitality of the corneal epithelium, leading at times to its exfoliation in blebs, or delaying the healing of corneal wounds, which depend largely on these cells for their prompt repair. Hypodermically, it has much control of bleeding as well as pain; but I hesitate to use it, except where the area can be largely isolated. In aural work its value is not so great; brucine excels it as an anæsthetic, and morphine and atropine as analgesics. Its most striking value is in the study and treatment of nasal conditions, where its power of reducing swelling and reflex irritability permits of diagnosis and topi-

cal treatment, otherwise impossible. Its unaided effect is of little value, but it opens up the nasal cavities to more lasting remedies. My only case of poisoning by it was from pledgets of cotton inserted in the nares."*

38. Dr. G. Oram Ring: "I have found the use of cocaine a most valuable addition, as applied to the treatment of diseases of the eye, the throat, and the nose. The instillation of a few drops of a two to a four per cent. solution renders it possible to perform any of the more frequent eye operations with comparatively little pain, those of a plastic nature and enucleations, of course, excepted. Even in those rare cases where ether is contraindicated in the performance of the latter operations, cocaine is a distinct aid.

"The exceedingly sensitive iris responds but feebly to its action. In the tenotomy of eye-muscles in children, I have found it usually necessary to administer ether. I have repeatedly noticed a smarting sensation, caused by the use of the drug, even when the cornea and conjunctiva have been previously rendered anæsthetic by its use. I have discontinued its use hypodermically in removing chalaza by the skin incision, because of the difficulty sometimes experienced in recognizing the position of the tumor after the distention of the lids following the injection. Anterior rhinoscopic examination I very rarely attempt to make without retracting the tissues by the use of cocaine. A thorough inspection of the turbinals is by this means rendered possible. In the more frequent nasal operations,—removing polypi, ecchondroses, and hypertrophies,—I prefer using a ten per cent. solution of cocaine, although the weaker solutions answer a very useful purpose. In straightening the deviated septa, cocaine, in my experience, has not produced a sufficiently pronounced anæsthesia, and in such cases I usually resort to ether. In the reduction of hypertrophied tonsils by the application of chromic acid or the galvanocautery, I rarely find the employment of cocaine necessary. This applies also to the operation of tonsillotomy."

39. Dr. Samuel D. Risley: "My experience with the use of cocaine in ophthalmological practice is a very favorable one. I employ, for the most part, a two per cent. solution. This solution I use habitually, not only to relieve pain in cases where surgical interference is necessary, but also to relieve irritation in abrasions of the cornea from accident or disease, and to aid the stronger mydriatics in securing a rapid and wide dilatation of the pupil, or alone, to secure a transient dilatation. I use the drug for all kinds of surgical interference about the eyes, except for plastic operations involving the eyelids, and for enucleation of the eyeball. One annoyance I have experienced from its use is the often severe smarting occasioned by the instillation of the most carefully-prepared solution, and, curiously, the drug is not competent to protect the eye against this. Another source of annoyance has been the frequent abrasions of the corneal epithelium following repeated instillations. I have, however, never witnessed any permanent injury from its use."

40. Dr. John B. Roberts: "I find cocaine of value in ophthalmic and in minor surgery. I use it in these cases quite frequently. In the operations for phimosis, ingrowing toe-nail, and the extirpation of small tumors, I find the use of the drug exceedingly satisfactory, as well as in the extraction of cataracts. I believe it to be important that the tissues upon which it is employed should not be alkaline. This point I have gained from reading, however, as I have not made any special study of it. I usually incarcerate the drug where it is possible to do so."

41. Dr. Carl Seiler: "I have carefully observed the action of cocaine, as used in my practice, ever since the introduction of the drug into surgical practice. My experience is, that the drug, in solution, not stronger than four per cent., is a local anæsthetic if applied to the mucous membrane; but that it has no action whatever on the unbroken skin. In operations upon the nose and the throat, I have used the drug with great success and satisfaction, so much so that now I can perform operations for the removal of hypertrophies or bony excrescences, without pain to the patient, where formerly I was obliged to employ ether or chloroform, and to suffer the attending loss of time and annoyance incident to the use of a general anæsthetic.

"The manner in which I use cocaine is to saturate a piece of cotton with the four per cent. solution, and introduce it into the nose, where I allow it to rest in contact with the mucous membrane, at the seat of the intended operation for five or ten minutes. I never employ the spray or instillation, because either of these methods causes absorption of the drug and the consequent systemic effect of cocaine-poisoning, which are frequently spoken of in the medical journals. The nasal mucous membrane, not being an absorbing surface, allows the cocaine to act purely as a local anæsthetic,

* See *University Medical Magazine* for April, 1889.

and no fear need be entained of any toxic effects being produced. I frequently use cocaine as a diagnostic aid in order to determine whether a swelling in the nose is a genuine hypertrophy, or whether it is merely a tumefaction, due to an acute inflammation. In the former instance, the swelling will not be reduced in size, while in the latter case it will entirely disappear under the influence of the drug."

42. Dr. Geo. E. de Schweinitz: "Since the discovery of cocaine the vast majority of operations connected with ophthalmic surgery are performed without the use of general anæsthesia, and there is probably no branch of surgery in which this drug has a more useful application. It does not retard the process of healing after operation, and if properly employed rarely causes toxic effects. In addition to its power of benumbing sensation, through its influence on the peripheral trigeminal fibres, it probably possesses the property of constricting the blood-vessels and reducing intraocular tension. Under its influence there is some drying of the epithelium of the cornea, hence it is advisable not to use it for too long a period before an operation, or, if it is used, that the lids be kept closed until the moment of the operation. There are few contraindications to its use, and even in glaucoma, with the possible exception of advanced chronic types of this disorder, it may be instilled into the eye preparatory to operation. The use of cocaine as a collyrium in inflammatory diseases of the cornea and conjunctiva probably does not belong to your subject, but I cannot resist the temptation of saying that its employment in these forms of inflammatory disease is often a distinct disadvantage to the patient. It is true temporary relief by the production of local anæsthesia ensues, but very often corneal ulceration will be markedly aggravated, especially by prolonged use, and its injudicious application in these cases should be deprecated. This does not refer to the production of temporary anæsthesia in those cases of corneal disease where it is necessary to employ the actual cautery, the curette, paracentesis, or similar operations. Neither would it be contraindicated as a single application for the purpose of examination, or for temporarily controlling congestion, in order that such examination might be more thoroughly made. The occasional reports which have been published in regard to failure of operation on account of cocaine, are probably *post hoc* and not *propter hoc*. It is needless to point out that in every operation a perfectly fresh solution should be used, preferably made in distilled water to which some boracic acid has been added. If the globe of the eye requires operation, the solution is instilled into the conjunctival sac; if an operation upon the lids is needed, better results will be obtained if the area of operation is enclosed in a clamp before the hypodermic injection is given, thus preventing the drug diffusing itself too widely through the loose cellular tissue; if the tendon of a muscle is to be divided, as in tenotomy for strabismus, a drop of the solution should be injected with a pipette into an opening made into the conjunctiva and capsule of Tenon, before the tendon is taken up by the hook preparatory to its separation."

43. Dr. J. H. C. Simes: "My experience with cocaine has been favorable as well as otherwise,—that is to say, I have employed it with much satisfaction in minor operations, and with no untoward results. Again, I have had its use to be followed with the most disastrous results,—viz., death.* Therefore, I consider the drug a dangerous one; and, while in most cases in which it is used there may not be any unfavorable effect, the cases in which the effect is not favorable cannot be distinguished from those in which it acts favorably. In other words, what may be a perfectly harmless dose in one person may be a dangerous, if not a fatal, dose for another. In the employment of the drug I have restricted myself to the following rules: Never to use a solution stronger than five per cent. Never to apply it to a mucous membrane when it is abraded, lacerated, or cut. Never to use it hypodermically, if the region cannot be cut off from the general circulation by means of an elastic ligature."

44. Dr. A. L. Stavely: "My experience with cocaine has been eminently satisfactory. In injuries to fingers and to toes, requiring amputation, and in the opening of felons, I have found that where the circulation could be arrested in the part, its anæsthetic effect was all that could be desired; but in the extraction of toe-nails it does not answer so well. I have successfully removed sebaceous cysts and small lipomata without pain, and have found it to be of the greatest service in the extraction of foreign bodies from the cornea or conjunctiva."

45. Dr. Joseph P. Tunis: "In the surgical dispensary of the Episcopal Hospital I have seen solutions of cocaine employed hypodermically in thirty-six cases requiring amputation of a finger or of fingers, as well as in several other minor operations. After the drug was injected under the skin no pain was experienced. A boy, of 4 years of age, sat on his father's knee, and talked quietly to him while I removed a

* See the *Philadelphia Medical Times*, July, 188[illegible]

mangled finger. Nervous, high-strung girls, after the primary incision was made, and no pain produced, were practically convinced of the anæsthetic power of the drug, and would witness the removal of a finger without a whimper. In only one case did I notice toxic effects of the drug. A girl of 14 had her index and second fingers severely crushed, accompanied with a deep tear of the palm. Two syringefuls of a four per cent. solution of cocaine were injected into the fingers after the loose application of an elastic ligature. Bleeding was not completely controlled. Giddiness, nausea, slight delirium, and embarrassed respiration soon followed the injection. About twenty minutes later her respirations were eight to the minute. Kept in the supine position, she rallied in about two hours, without further toxic symptoms. No medication was used. The cause of the untoward effect of the drug in this case I ascribe to the improper application of the ligature. Six syringefuls of the same cocaine solution, injected into three fingers, in another case, requiring amputation, produced no unpleasant result. In this latter instance, the circulation was properly controlled, and before the sutures were inserted free bleeding from the parts was encouraged."

46. Dr. Jas. Wallace: "My experience with cocaine dates almost from its introduction into surgical practice. It has supplanted the use of ether in nearly all the operations on the eye, and affords a satisfactory anæsthetic for the cornea and conjunctiva, and a partial one for the skin. I do not think of employing ether now for cataract extraction, iridectomy, strabismus, or for cystic tumors of the lids, except in children, where complete control of the patient's sensibility is rendered necessary. In inflammations of the cornea and iris, accompanied with pain, it is a valuable adjunct to other remedies; it increases the effect of atropine in dilating the pupil in iritis. In acute inflammations of the conjunctiva, a few drops of the drug will dissipate the congestion, as a rule, in a very few moments. Cocaine produces such complete insensibility of the cornea that the sections of this membrane in cataract extraction and glaucoma are rendered painless. It has little or no anæsthetic effect upon the iris, unless the iris is prolapsed, and the drug is dropped directly on it. At times it seems to have an injurious effect in producing opacity of the corneal epithelium. In prolonged operations upon the eyelids its effects are not sufficient for operative purposes. It is of no use in enucleation of the eyeball. I have seen no toxic symptoms follow the employment of cocaine. I use it in solutions of two and of four per cent. strengths. I prefer a freshly-prepared solution, for it is more than probable that cocaine deteriorates upon standing for any great length of time."

47. Dr. H. R. Wharton: "I frequently employ cocaine in trifling operations, and think very well of it. I have seen no untoward symptoms follow such administration. I seldom employ a solution stronger than four per cent."

48. Dr. J. Wm. White: "I do not use cocaine a great deal. Occasionally, in sebaceous cysts of the scalp and in small fatty growths, it is useful to prevent the pain of the skin incision. In larger operations it is not to be relied upon, in my opinion. In urethral cases I only employ it where I have to overcome unusual sensitiveness of the urethra to the passage of exploratory instruments. In the treatment of strictures, cocaine is unnecessary for meatotomy and for the decision of strictures within the first half inch. Urethrotomy, posterior to that point, should not be an office operation, and ether is preferable to cocaine. Where the latter drug is for any reason employed in the urethra, it is well to guard against its absorption into the general circulation by elastic constriction of the root of the penis. I have seen very alarming results from the use of urethral injections of cocaine, though I have never had a fatal case. I have found its employment, in the shape of lozenges, a good preliminary to removal of the uvula, to scarification or excision of the tonsils, and to the opening of tonsillar and pharyngeal abscesses. I have sometimes used it in cases where a single enlarged gland required excision and has superficial adhesions without deep ones."

49. Dr. De Forest Willard: "In all cases of surgery, where the mucous membrane is involved, I have found the use of cocaine eminently satisfactory. Many minor operations, some quite severe, can be performed with decided comfort to the patient under cocaine anæsthesia. But when the skin requires section, and when the subcutaneous tissues and muscles require division, I have not been at all pleased with the effect of the drug in annulling pain. Of course, in a member where the circulation can be controlled, the effect of cocaine can be greatly enhanced, and in those cases where ether and chloroform are absolutely contraindicated, it is a useful adjuvant in our work. The pain occasioned by the hypodermic injection is, however, in many instances, nearly equal to the operation itself, especially if a number of punctures are necessary."

50. Dr. Chas. Meigs Wilson: "I have used cocaine in a six per cent. solution in but two cases, both patients with lacerated perinei, and in each instance I failed by its use to completely control the pain of denudation."

51. Dr. James K. Young: "I consider cocaine one of the most important additions to our list of useful drugs made during the last quarter of a century. In my experience, it is most effective when applied to mucous surfaces and when confined within the operative area. In eye operations it is my custom to employ two drops of a four per cent. solution, allowing an interval of five minutes between the instillation of each drop. With this small quantity all the ophthalmic operations have been painlessly performed, except enucleation. In iridectomy a sensation amounting to the severity of a pin-stick has always been experienced. The first steps of an enucleation—the conjunctival section and tenotomies—may even be painlessly performed, but the section of the nerves cannot be performed painlessly under cocaine anæsthesia, and I always employ ether. As a local anæsthetic in applications of the electro-cautery to nasal operations, the most beneficial effect has been experienced. In operations involving the skin, unless the area has been included by a rubber band or clasp, failure to produce entire relief from pain has been the rule, so that in tenotomies I prefer the rhigolene spray, or the local application of ice and salt, preferring the latter. Cocaine-poisoning has appeared to me to occur most frequently where large venous sinuses quickly absorb the drug and carry it into the general circulation, as in the nose, rectum, deep urethra, etc., but it has been my good fortune not to have had a case of cocaine-poisoning. The advent of cocaine anæsthesia is still fresh in my memory, and during this period it has revolutionized ophthalmic and nasal surgery."

Such has been the experience with cocaine of the gentlemen whom I have consulted. My own personal experience with the drug has been confined to the amputation of fingers and of toes; to the removal of ingrowing toe-nails; to the extirpation of small tumors, such as sebaceous cysts of the scalp, lipomata, etc.; to the removal of foreign bodies embedded in the cornea; to relieve the pain induced by the scarification or excision of the tonsil; and, finally, to relieve the excessive irritability of the urethra before the passage of an instrument. I have employed cocaine for its local anæsthetic effect in such instances as have been enumerated, in over one hundred cases. A four per cent. solution of the drug has been the strength invariably employed. In cases requiring amputation for injury, the part has been rendered aseptic, after which an elastic ligature is made to encircle the extremity. This ligature is preferably a piece of rubber tubing, for the reason that more uniform constriction is obtained, with less damage to the soft tissues. Due care is observed to see that the hypodermic syringe and needle are perfectly clean, after which the solution of cocaine is injected, first into the tissues through the wound, and subsequently through the skin. This procedure is adopted for two reasons,—to avoid the pain of a primary puncture into the skin, which is a very sensitive structure; and to make use of this sensitiveness, if it exists after the cocaine has been injected through the wound and has been allowed a few moments' time to exert its anæsthetic effect, in order to determine whether the part is sufficiently anæsthetized to permit the completion of the operation. From twenty-five to forty minims of the solution are injected at various points around the seat of the operation. From three to five minutes is sufficient time to wait for the action of the drug. Upon the completion of the amputation, and before the sutures are tied or the hemorrhage is controlled, free bleeding from the stump is encouraged, the object in view being to get rid of as much of the unabsorbed cocaine as is possible. Cocaine used in this way has, in my experience, always proved efficient for the entire relief of pain in suitable cases where a local anæsthetic was indicated. I have yet to experience any untoward effects from the use of the drug.

To sum up the status of the hydrochlorate of cocaine, as based upon the experience herein represented, it will be more convenient to consider separately its use in the various fields of minor surgical practice.

1. *In minor surgery*, cocaine, when used hypodermically, is of value in all operations in which the circulation can be temporarily arrested, in order to prevent undue absorption of the drug, and in which free bleeding can be encouraged at the completion of the operation previous to the tying of the sutures, to allow as much of the unabsorbed cocaine to be washed out as is possible. Attention paid to these two essential points will, as a rule, obviate any un[illegible] toward results from the use of cocaine employed hypodermically for anæsthetic purposes. It is likewise important to make use of freshly-prepared solutions, as otherwise the formation of fungi is liable to occur and the preparation

be spoiled. To prevent this alteration, antiseptic agents are added, the best one being boracic acid, as it is the least irritating. Such a solution usually consists of about twenty grains of cocaine and ten grains of boracic acid, dissolved in an ounce of distilled water. A preparation of this character has been used by the writer with perfectly satisfactory results, even when it has been over two months old.

Another point of considerable importance in using cocaine hypodermically is to make use of a perfectly aseptic syringe; frequently, in cases where the drug is so used and suppuration follows, it is the fault of want of cleanliness in this particular, and not to the employment of the drug.

A four per cent. solution is as strong as need be used for hypodermic injections. The principal advantages in using a solution of no greater strength are, that the anæsthetic property of cocaine can be made to reach to a larger area with a less amount of the drug than is the case when a more concentrated one is employed; and, furthermore, the dilution of the drug renders it less liable to produce toxic symptoms.

When the circulation cannot be controlled, extreme caution must be observed in the use of the drug, especially is this the case when any considerable quantity is required.

In anal work, cocaine is not of much use as a local anæsthetic; when so used it must be employed cautiously. It is of no use in obtunding the pain of fistulous tracts or of fistulæ *in ano*. Toxic symptoms are apt to ensue when the drug is employed in this region. The rich lymphatic and vascular supply of the part probably accounts for this fact.

For the purpose of controlling the circulation, a piece of elastic tubing is to be preferred to a solid ligature, as less damage is done to the soft tissues and more uniform constriction of the part is obtained.

In amputation of fingers and of toes for injury, less pain is occasioned the patient if the primary injections are made through the wound, reserving the punctures through the skin until a later period, when the sensitiveness of this structure may be made use of in determining the degree of anæsthesia produced.

The quantity of cocaine required to produce anæsthesia varies with the operation and its extent; as a rule, for ordinary minor operations, from twenty-five to forty minims of a four per cent. solution are needed. The length of time necessary for the production of local insensibility under cocaine varies from three to ten minutes.

Individual susceptibility to the toxic influence of cocaine is a complication of sufficiently frequent occurrence to surround the use of the drug with due care and caution, but it is not a contraindication to the employment of the agent as an anæsthetic. Untoward effects may arise from the use of any one of the anæsthetic substances.

Another objection urged by some surgeons to the employment of cocaine for anæsthetic purposes is based on its asserted power of inducing the so-called "cocaine habit." As yet, this influence of the drug is extremely rare. It is most liable to occur among the patients who are informed of the nature of the remedy used, and especially is this the case when it is employed internally for medicinal purposes. I hardly believe that this action of cocaine can be produced when it is employed for its local anæsthetic effect and in the small quantity needed to induce local insensibility.

2. *In genito-urinary surgery*, cocaine is to be used with more than ordinary care, as it is in this class of cases that the untoward effects of the drug have been most frequently noted. It has been employed successfully to allay excessive irritability of the urethra before the passage of sounds or of bougies: it is important, in such instances, not to allow the solution to remain in contact with the mucous surface more than a few moments, and to subsequently encourage the outflow of any excess.

In the operation for circumcision, the anæsthetic action of the drug is prompt and efficacious, but it is important to remember that the circulation must be controlled before the injections are made, and that after the foreskin is removed and the sutures inserted, but not tied, that the ligature employed to regulate the blood-supply is removed and free bleeding allowed, that as much of the drug as possible may be washed out of the system.

For the purpose of preventing the pain incident to the removal of venereal warts, or in the cauterization of venereal sores, the drug is satisfactory.

For the production of anæsthesia, previous to the operation of internal urethrotomy, opinions differ as to its efficacy and to the danger involved of producing the toxic effects of the drug. The weight of evidence seems to prove that cocaine is not to be employed indiscriminately in these cases, and when used should be administered with caution and with a knowledge of the possible risks involved. That it is possible to avoid any untoward effects from its use in the operation is shown by the testimony of Dr. John B. Deaver, who has employed co-

caine in a large number of operations requiring internal urethrotomy without experiencing the slightest ill-effect to the patient.

3. *In gynæcological practice*, the drug has a limited field of usefulness. As a rule, in operative procedures classed under this head, general anæsthesia is to be preferred, as the patient's knowledge of the exposure of her person is often quite sufficient to unnerve her for the operation, and may even be the means of frustrating the surgeon's work.

For slight operations and those easy of performance, such as the extirpation of vascular vegetations at the mouth of the meatus urinarius, the removal of stitches from the vagina, etc., anæsthesia from cocaine is all sufficient. For the vaginal examination of highly nervous and hyperæsthetic women, cocaine, applied to the orifice of the canal, will render comparatively easy an otherwise difficult operation. For the primary repair of the perineum, when an anæsthetic is indicated, a dossil of cotton saturated with a solution of the drug and placed in the wound will accomplish the desired purpose.

4. *For ophthalmological work*, the surgeon finds in cocaine the anæsthetic *par excellence*. In no other department of surgery do we find its use so widespread and its application so entirely satisfactory. While this is true, it must be remembered that to obtain the best results it is more essential here than elsewhere to employ a perfectly pure drug in a freshly-prepared solution. Many of the untoward effects ascribed to the use of cocaine in eye surgery are due undoubtedly to the neglect of these two essential points.

All of the operations upon the eyeball may be performed under cocaine anæsthesia, except iridectomy for acute glaucoma (see reply of Dr. L. Webster Fox, Letter No. 13) and enucleation. Even in the latter instance, according to Dr. Albert G. Heyl, where the patient does not come under the influence of the general anæsthetic, or when it is desirable to shorten the duration of the operation, the instillation of a solution of cocaine enables one to begin it earlier than would otherwise be possible; he, therefore, sees no reason why the drug should not always be used in the operation with this object in view.

Owing to the effect of the drug on the cornea in producing drying of the epithelium, it is essential not to use it too long a period before an operation, and, when it is instilled, that the lids be kept closed until the moment of beginning the same.

5. *In operations upon the ear, nose, and throat*, cocaine is of great value as a local anæsthetic. It is also of use as a means to render diagnosis of the condition of these parts easier and more certain.

In aural work, according to the testimony of Dr. B. Alex. Randall (see Letter No. 37). Brucine excels cocaine as an anæsthetic, and morphine and atropine as analgesics. In nasal cases the drug is of extreme value both in the study and the treatment of abnormal conditions. Dr. J. Solis-Cohen and Dr. Carl Seiler both speak in the highest terms of its use as an anæsthetic in operative procedures upon the nasal chambers.

For the purpose of rendering the exploration of the larynx easy, the excision or scarification of the tonsils painless, and to permit the painless removal of pharyngeal neoplasms, elongated uvulæ, etc., cocaine is the anæsthetic indicated.

In concluding this paper, I would express my obligation to the gentlemen, whose letters are herein incorporated, for their courteous replies to my communications of inquiry regarding their experience with cocaine in minor surgery. To them belongs the credit of any value which this article may possess as a contribution to the clinical study of cocaine as a local anæsthetic.

1610 ARCH STREET.

CREOLIN IN DYSENTERY, SEROUS DIARRHŒA, AND SUMMER COMPLAINT.

BY EDWARD W. WATSON, M.D., PHILADELPHIA, PA.

BELIEVING that many unrecorded bits of experience would be of use to the practitioner if published, I wish to call attention to the value of creolin as used by enema in dysentery and allied conditions.

The spring of 1890 in Philadelphia was marked by a considerable prevalence of acute dysentery of a typhoid character in scattered localities. It occurred to the writer while searching for a safe and efficient antiseptic to use creolin. It evidently occurred to others in the same way, for, after using it for some time successfully, I noticed in a current journal a quotation from a Russian source, wherein its use was advocated for the same complaint. In regard to personal experience, the small epidemic enabled me to employ it during the month of June, 1890, on twenty-three cases. These were of all grades. Some at the beginning, others almost exhausted; but in all but one the use of a large enema, containing one-half of one per cent. of creolin,—one drachm to a pint,—was followed by

results quite surprising. One of the worst cases, a girl of 12, in the fourth day had had between thirty and forty stools, bloody, shreddy, and fetid, and, after an enema at 7 P.M., did not require the pan, had no stool or attempt, slept quietly all night, and had a formed movement in the morning. This, as in all the cases, without any other medication. Another, a boy of ten, seemed moribund, but after an enema, the number of mucus stools, which had been in the previous twelve hours thirty-five or forty, was reduced to one, and after a subsequent enema normal passages occurred. This child's two brothers were attacked during my second visit with violent symptoms. An enema was administered to each, and no subsequent sign of the disease occurred at all. In short, all the cases recovered, in whatever stage they were, from the commencement of the treatment. Contrasting this with the usual course of dysentery, and its exasperating uncertainty, even with the saline treatment, one can claim that so far creolin is without an equal. The one exception puzzled me for some time, until I discovered that the mother, ignorant of how to use an enema, had simply omitted it, and lied.

But from this use of the creolin to another was but a step. As the season advanced numerous cases of "summer complaint"—colitis and entero-colitis—occurred as usual, and it occurred to the writer to try the same method. These were infants, and the amount of creolin was reduced to one-half drachm to a pint of warm water, and twice a day the bowels were flushed with a gravity syringe. Here the result was also everything that could be expected. Bearing in mind that it was not employed in the cases of *sudden* onset, bounding and rapid diarrhœa, which are called cholera infantum, but in the more frequent, equally dangerous, but more protracted cases, where diarrhœa sets in, keeps up, and gradually wears out the infant, with recurring exacerbations, till finally often the so-called cholera infantum extends with such violence as to destroy what little resistance and life remain. In short, wherever there was diarrhœa, with green and bloody or mucus stools, undigested curds, etc., the remedy, when faithfully used, rapidly restored the natural character and frequency to the evacuation, and the immense improvement to the child showed that besides remedying the catarrhal process, there must be also something to be credited to the washing out of deleterious secretions.

Having little or no dysentery to treat up to this date, in 1891, I have been employing the remedy in these cases this year with the same success. I would also note that during the winter occasionally in young infants I met with cases of sudden and rapidly-exhausting serous diarrhœa. All of these, which were treated in this way, three in all, were so treated after the usual medication had failed and with rapid success, and I think that there is enough in it to warrant calling attention to it and the giving it a further trial.

131 North Twentieth Street.

THE VALUE OF CHLORALAMID AS A CALMATIVE IN THE FINAL STAGES OF HEART-DISEASE.

By J. A. Patterson, M.D., Salem, N. J.

CHLORALAMID being one of the newer remedies, I feel that the report of cases bearing upon its action in detail would be of value to the profession. It appears to me that we are apt too frequently to look only at the more decided and outspoken action of remedies, thus failing to note their smaller and more remote characteristics, the latter characteristics ofttimes becoming of the greatest value in prescribing. I therefore beg to offer the following notes:

Mrs. M., aged 60, had been a sufferer from heart-disease for the past eight years. When she first consulted me, two and one-half years ago, dyspnœa, cough, and consequent inability to sleep caused her the greatest suffering. Aortic stenosis was found existing at that time. One year ago she was ailing all winter, but the warm weather of early summer aided her convalescence. The advent of cold weather last fall again increased her suffering. Dropsy, which had heretofore been very slight, being only noticeable at the ankles, now gradually increased, and the urine became albuminous. The disease slowly progressed towards its fatal issue. I had been gradually forced by her suffering to increase the quantity of morphine, which I had first started in small doses hypodermically, until it became ineffectual, except in such large doses that I feared it might prove disastrous. My thoughts now turned to chloralamid, which I had used as a mere hypnotic, but had not tried in such extreme cases. I had given it in only one case of heart-disease, that being a mild case of aortic disease, characterized by insomnia and debility, no failure to any extent in compensation having occurred. At that time I could find nothing in

literature that would give me information as to its freedom from danger in such cases. I therefore began its administration cautiously. My patient at this time could not lie down. She would occasionally get one to three hours' sleep under a large dose of morphine hypodermically. Chloralamid was begun in 10-grain doses, at first using a smaller injection of morphine, until 40-grain doses were administered. The morphine was gradually lessened, and finally its administration ceased. The patient obtained *better* and *longer* rest and sleep in a recumbent position than when morphine alone was being administered. I watched its effects closely, and was gratified to find the pulse not made worse, but rather improved.

The case terminated fatally, but the relief obtained by promoting slumber in a recumbent posture by means entirely within the bounds of safety makes the remedy of great value in this class of cases.

PERMANGANATE OF POTASSIUM AS A URINARY TEST.

At the meeting of the Hunterian Society, held February 25, 1891, MR. F. R. HUMPHRIES read a paper on the reduction of permanganate of potassium by the urine, in which he stated (*British Medical Journal*, March 14, 1891) that, after testing the known organic and inorganic constituents normally present, he came to the conclusion that a phenol was the only one which could produce this effect. The phenol might be present in such a form as to admit of ready oxidation. Baumann had proved that phenol, besides being made in the intestine, was also formed during the decomposition of albumen. The reducing body corresponded in its diurnal variations with urea and the uncombined sulphates; it was, therefore, certain that it was, like them, a product of the metabolism of the tissues. If the reducing body was a phenol compound, it ought, when retained, to produce cerebral and nerve effects. It was remarkable that the forms, degrees, and symptoms of carbolic acid poisoning bore the very closest resemblance to those of uræmia, and that several of the most useful drugs in the latter condition were antidotes in the former. It was found that when the excretion of the reducing body was much diminished or increased, symptoms of uræmia were generally present. One cubic centimetre of a five per cent. solution of permanganate was diluted with 4 or 5 parts of water in a test-tube, and the urine rapidly run in from a pipette marked in cubic centimetres. The normal amount of the reducing body excreted in the twenty-four hours was found to be from seventeen to thirty-four grains, reckoned as permanganate, being highest in the first urine of the morning, in that passed four or five hours after a meal, and in fine warm weather. It was much increased in all febrile cases, except when marked cerebral symptoms were present; much diminished during a sick headache, but increasing rapidly as it passed off. The author claimed to have discovered the presence of a powerful reducing body in the urine, whose daily history showed it to be a product of the metabolism of the tissues, whose reactions corresponded to a certain extent with those of a phenol, and whose suppression or excess corresponded closely with febrile cerebral symptoms, and with those of uræmia.

DR. W. HUNTER said the views of Proust and Thudichum on urine pigments were foremost down to 1870; since then Jaffé had opened a new era. The coloring-matter was no longer looked on as an independent body, but as a variety of pigments whose genetic relation to those of the bile and blood was established. Bilirubin was, without doubt, of the same nature as hæmatoidin; the relation was illustrated in old blood extravasations where blood was found in the centre; then an area of hæmatoidin crystals, and outside the green color of biliverdin. The modifications of urobilin found in urine (MacMunn) were almost precisely the same as those found in the bile. Urinary pigments were extremely unstable, and readily passed from one body to another when exposed to the air to a few drops of acid. He viewed, then, with suspicion the results of such heroic methods as the use of phosphomolybdic acid, and relied more on the spectroscope and simple extraction with ether, etc. These methods led to the belief that all the pigment was derived from the blood, and was hence an index of changes in the body.

DR. LEWIS JONES had found a red body in febrile urine, giving a band at F, the junction of green and blue; this was urobilin, the uropittin, he supposed, of Dr. Thudichum. The color of normal urine was due to a yellow body, which gave no characteristic spectrum, and was unknown.

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Leading Articles.

THE PROPHYLAXIS OF DIPHTHERIA.

ONE of the results of recent bacteriological researches is the tenacity of life which the Klebs-Lœffler bacillus presents. Roux and Yersin have kept for six months a culture in broth in a tube tightly sealed; this, when sown anew, gave strong colonies, and proved to be very virulent in the guinea-pig and hare. Clinical experience has confirmed the experience of the laboratory.

In diphtheria the substratum of the contagion is solid; the virus resides in the false membrane. If the liquids of the mouth are vehicles of the poison, it is through the fragments of false membrane which they contain. This contagion, deposited on cradles, furniture, the walls of the room, tapestry, has been known to be active after months and even years. Cadet de Gassicourt gives instances where the disease was contracted in a virulent form by sojourn in a room where months before a child had died of diphtheria. Darolles gives a "history of a cradle," which is instructive in this respect. In the course of an epidemic in the country, an infant died in a wicker-cradle of diphtheria. Darolles urged the parents to destroy the cradle, but they refused. Eighteen months afterwards another infant contracted diphtheria in the same place at a time when the disease was unknown in the village and died. Two years afterwards, a third infant contracted diphtheria in the same cradle and got well. The parents consented to destroy the cradle, and there were no more cases of diphtheria in that family.

Sevestre, in his "Études de Clinique Infantile," gives examples of the same sort. The contagion is exceedingly prone to cling to clothing, and the disease has in many instances been traced to this source. In one case, a scarf worn around the neck of a child that had died of diphtheria seems to have been the means of communicating the infection to a sister of the deceased.

Fortunately, the contagion is of a heavy nature, and is but little diffusible; the disease may attack a family and spare the neighboring families, and thorough disinfection seems markedly to limit its spread.

There is some evidence that the disease has been communicated by fowls sick with a kindred affection, and that it has been conveyed in milk sold from dairies attached to houses where there are cases of diphtheria.

In the prophylaxis of this disease, the first requisite is thorough isolation of the patient. The same isolation should, as far as possible, be made to extend to other members of the family. Physicians attending the sick child should scrupulously disinfect their persons and their clothing. All clothing that has been worn by the patient should be subjected to prolonged boiling, or to a dry heat of 240° F., before being again used. Thorough antisepsis of the sick-room should be practised, by sublimate washings and by burning sulphur. Children that have become convalescent should be disinfected by baths of weak sublimate water.

There should be suppression of suspected milk, and an inquiry into all other possible sources of contagion, with a view to removing them.

Maurice Nicolle makes a good hint in reference to physicians attending diphtheritic patients; they should put on a blouse before entering the sick-room, and remove it on leaving.

Dr. William H. Welch commends the prophylactic value, in persons liable to exposure to diphtheria, of cleanliness of the teeth and mouth, and of the frequent use of weak anti-

septic mouth-washes, nasal douches, and gargles. Lœffler recommends for this purpose aromatic waters, weak sublimate solutions (1 to 10,000), chlorine-water (1 to 1000), and thymol (1 to 500 parts of twenty per cent. alcohol).

RHUS-POISONING AND ITS TREATMENT.

THE symptoms and behavior of so-called rhus-poisoning should at the present day be sufficiently well understood to render remarks bearing thereon unnecessary; but the many vaunted and specific cures persistently brought forward year after year, as almost of lightning rapidity in their effect, would seem to indicate that some enlightenment or reiteration is still called for on these points. It is, first of all, not to be lost sight of that the inflammatory action is of artificial origin, that it is produced by an accidental, short-acting external irritant, and is not in any sense an idiopathic inflammation, such as eczema and similar diseases. Moreover, individuals differ as regards susceptibility, probably the majority being invulnerable to the poison, others but slightly susceptible; while in others, again, the action excited is extremely violent in character. The length of exposure, the dose of the poison, as it were, may also have a bearing upon the degree of inflammation. These factors, carefully considered, prove, as those of wide experience in the treatment of this condition know, that rhus-poisoning may be either mildly erythematous, erysipelatous, vesicular, pustular, or bullous. All of these types will disappear spontaneously, some, owing to the degree of inflammation, taking longer for repair than others. The type has, therefore, much to do with the duration of the attack. There is another point, however, which is sometimes overlooked, and that is that the skin of various individuals differs in reparative energy, thus explaining, irrespective of treatment, that the same type of the affection in different individuals may differ considerably in duration. Were these various facts properly appreciated, there would not be so many so-called specific remedial applications for the treatment of this affection advanced from time to time. In other words, the cures resulting as a part and in consequence of the natural course and behavior of this dermatic inflammation, are often erroneously ascribed to the special treatment employed. In this connection, to make this more emphatic, reference may be made to the vaunted brilliant cures effected (?) by the homœopaths by the internal administration of infinitesimal doses of the rhus plant itself. Briefly recapitulating, we have an artificial inflammation that may be mild or severe, always drifting towards cure, its duration, which may be but a few hours or several weeks, depending mainly upon the type and partly upon the individual. Exceptional individuals there are, it is true, in whom this irritation grafted upon a naturally eczematous skin, results in a stubborn and persistent eczema, but any external irritation in such cases would in all probability have the same effect, and such instances have in reality no bearing upon the subject in hand.

We do not mean to urge that the treatment of rhus-poisoning has no influence upon the course or duration of the disease; for, on the contrary, it always has the same as appropriate measures would have in any other artificial cutaneous inflammation; but it has no more and no less than this. There is, in brief, no one or several cut-short remedies, but there are appropriate and inappropriate applications, just as in the treatment of other inflammatory dermatoses. With the nature, behavior, and self-limited character of the condition recognized, the choice of proper remedial measures is not a difficult one. They consist of protective, soothing, astringent, and antipruritic applications. There are numbers of such remedies, as literature will show, which may be used successfully, safely, and with comfort to the patient. For the erythematous type, with or without erysipelatous swelling, lotions and dusting powders are the most grateful. Among the former may be mentioned carbolic acid in the strength of one or two drachms to the pint of water, to which may be added one to three drachms of alcohol and one-half to one drachm of glycerin; boric-acid wash, fifteen grains to the ounce, with or without a minute quantity of glycerin, and, if the itching or burning requires it, a small quantity of carbolic acid; boro-phenol, five or ten grains to the ounce; ichthyol, one to five grains to the ounce; zinc sulphate, one-half to one drachm to the pint; and fluid extract of grindelia robusta, two to six drachms to the pint. The wash employed may often be advantageously followed by a dusting powder, such as rice flour, starch, boric acid, or talc, or a mixture of these; or, in some of the extremely mild cases, the powder used alone forms a clean and comfortable method of treatment. For the mc

erately severe type, with vesiculation, the same remedies and plans as outlined above may be likewise employed, and found all that is required; or, what is probably more satisfactory in these cases, the wash used may be supplemented with an ointment, such as the oxide of zinc ointment, calamine ointment, cold cream, or petrolatum. Especially valuable is the combined treatment by lotio nigra and the oxide of zinc ointment. In this type also, in some instances greater effect seems to follow the application of an ointment alone. In the severe—pustular and bullous—types of the inflammation, the methods above mentioned may also be used as stated or with some modifications. If a wash is used alone, it should be applied by means of wrapping of linen or soft cotton, the parts being kept thus constantly and thoroughly wet. Ointments, if employed, must be thickly applied, spread upon patent lint or similar material, a small quantity of carbolic acid, thymol, or resorcin added to control the burning or itching present.

THE RADICAL CURE OF HERNIA.

THE victims of hernia in every community are numerous, and may suffer all their lives from their infirmity. Those are fortunate who, by wearing a light spring truss, obtain exemption from the more serious inconveniences; there are others to whom the presence of the truss is a perpetual annoyance and discomfort. There are many stubborn cases that can be but imperfectly remedied by any retentive apparatus, and such persons are always menaced by strangulation.

Among the afflictions which fall to the lot of the country physician is the care of difficult hernia cases. He will be continually consulted by patients whom experts have failed to fit with a suitable truss, and he will be put to his wit's end to relieve such patients. This is especially true in reference to herniæ in infants.

It cannot be denied that the stand-point of the surgeon of the present day, in respect to the treatment of hernia, is different from the stand-point of half a century ago. Before the days of antisepsis, he approached a necessitated herniotomy with fear and trembling. He had virtually to perform an abdominal section involving the peritoneum, and the danger attending peritoneal wounds was vividly present to his mind. It was only after thorough taxis, aided often by ice applications and tobacco enemata, that he would venture on a cutting operation, and then too often, when the sac was dissected out and opened, gangrene was found to have invaded the sac and intestine, a gangrene caused by long continuance of the strangulation and the violent measures used to reduce the hernia.

If, in a former day, there was such reluctance on the part of surgeons to do a herniotomy, there is much less cause for timorousness and delay at the present day, when the operation, if done antiseptically, is so safe; and it is a well-understood tenet of modern surgery that, in a case of strangulated hernia, when, after the administration of an anæsthetic, a certain amount of taxis, not too prolonged or too energetic, but performed with care and skill (*arte, non vi*), has failed, the surgeon should immediately resort to the knife. The steps of the operation have not materially changed of late years, only it is done as antiseptically as possible; there is now a general consensus among surgeons that the sac should be opened and the intestine examined before being returned to the abdomen; it is also customary, as it was among good operators fifty years ago, to excise redundant portions of the sac after proper ligation to prevent hemorrhage. If nothing more is done except proper closure of the wounds and the application of antiseptic dressings, the operation is often attended with cure of the hernia; effusion of lymph follows, and the formation of cicatricial tissue, which may be sufficient to close the hernial openings and prevent any future descent of the bowel. At any rate, the hernia, if it returns, is generally more easily managed after the operation.

Should the surgeon go further than this? Should he complete the herniotomy by certain procedures intended to constitute *the radical cure?* Ought patients who are great sufferers from herniæ, which are with difficulty, painfully, or incompletely kept reduced, to submit to the "radical cure," even though strangulation has never happened? In answer to this question, it should be borne in mind that the mortality from hernia operations under antisepsis is very small; good operators, as MacEwen, Marcy, Halstead, McBurney, Gerster, Gibney, Senn, Warren, Keen, tabulate almost uniform success. Great numbers of bad cases have been completely cured, and after months and even years of exemption from their old infirmity, affirm most emphatically that the gain has been

worth all the risk. Considering, then, the little risk of death and the reasonable prospect of success, it would seem that this operation is justifiable wherever a person long afflicted, and more or less disabled by a bad rupture, desires to be cured. With regard to the first question, if, as good authorities now teach, the gravity of a herniotomy is not enhanced by making a few sutures designed to close the rings and the canal, and if the radical cure operation gives the patient a better chance to get rid of this hernia, the surgeon should not neglect any of these precautions.

It is our purpose in the present article to treat only of that most common form of rupture known as inguinal hernia (though the general principles are applicable to femoral and umbilical), and to omit all mention of obsolete modes of treatment, like those of Wützer and John Wood. Nor shall we touch upon the injection method, by which operators have sought to obliterate the hernial canal by exciting adhesive inflammation and exudation, various irritants being used for this purpose, as tincture of iodine or cantharides, a solution of oak bark, etc. This method, which has had considerable repute through Dr. Heaton and Dr. J. H. Warren, of Boston, is virtually but little employed at the present day.

An operation which has won much favor, and seems to be commended by its results, is thus described by Küster in the *Centralblatt für Chirurgie*, March 17, 1889. It consists in opening the sac in the usual way, restoring the bowel to the abdominal cavity, cutting off the sac, and stitching the edges carefully. After this the hernial opening is stitched (care being taken not to strangulate the cord), and the rest of the wound closed by successive rows of continuous catgut suture, so that there is no space left for any accumulation of blood or serum between the cut surfaces. After the skin is sutured, the wound is painted with iodoform collodion until no blood can come through the coating. After this no further dressing is applied.* Dr. Henry O. Marcy, who claims priority in the use of catgut or tendon sutures in this operation, having operated very much in the manner above described as far back as 1870,† has added an important modification in the use of the buried suture, by which the wound is finally hermetically closed. "The basic and fundamental factor," says Marcy, "consists in closing the divided and weakened structures by strong sewing with a carefully-prepared animal suture after removal of the sac. This is aseptically applied, and approximates the refreshened tissues by layers of buried suturing, so as to avoid the necessity of drainage, and thus allows complete closure of the wound hermetically sealed with iodoform collodion, a very simple but germ-proof dressing." The buried suture is best effected by the use of a slightly-curved Hagerdorn needle carried from within, through the deeper layer of the skin, from side to side. This evenly coapts the edges of the skin, without the vestige of a stitch in sight. The operation is conducted throughout under irrigation, a 1 to 2000 sublimate solution being used.

The uselessness of drainage is emphasized. Coapted surfaces, held aseptically at rest, readily tolerate the limited effusion which is utilized in the processes of local repair.

Marcy claims eminently favorable results for this operation. It is comparatively safe. He has never had a death. Out of seven hundred and seventy-nine cases which he has collated, there were but five deaths, and these are explained as having resulted from conditions not referable to the operation. As to its success, of cases which he has investigated, "fully ninety per cent. have been permanently cured."

One part of his operation on which he much insists is the reforming of the inguinal canal. "In large direct inguinal hernia, it is important to restore the obliquity of the canal, nature's wise provision for maintaining the closure of the canal by intra-abdominal pressure in health. This is effected by commencing at the lower and inner border of the ring, the cord having been gently laid to one side, and closing by double suturing quite to the inner opening of the ring upon the cord, which is now replaced, and the external pillars of the ring are closed by a similar suture downward and inward to the pubic tubercle."

Other surgical authorities (as Agnew, *Univ. Med. Mag.*, April, 1890) do not have so much faith in the suturing of fascia, and counsel repression of operative ardor till wider and longer experience has been attained. McBurney looks upon the suturing of the canal as of questionable utility. "No really fresh or raw surfaces are brought together, and as the overlying tissues are afterwards sewed and the whole wound covered with an antiseptic dressing, these sutures are purely sub-

* Quoted from "Sajous's Annual," 1879.

† "A Treatise on Hernia: the Radical Cure by the Use of the Buried Animal Suture," 1889, G. S. Davis; also *Journ. Amer. Med. Association*, November 2, 1889.

cutaneous ones and useless." It is, doubtless, more the exudation which follows the operation, and the subsequent cicatricial tissue-organization, closing the inner ring and narrowing the canal, that are really effective, than the bringing together of the edges of the ring and pillars.

The only certain measure, according to MacBurney, for obtaining complete closure of the whole inguinal canal, except the portion occupied by the cord, is by the open treatment.

As this operation has not been before described in the GAZETTE, we will devote some little space to the principal details of the operation, at the risk of making this article unduly long.

"To insure firm and dense cicatricial tissue throughout the length and depth of the canal, one must carefully pack by some dressing down to the transversalis fascia in the lower, and to the peritoneum in the upper, part of the canal.

"Before operating, most careful antiseptic precautions are taken, especially in cleansing surrounding parts. The incision begins a little outside the inguinal ring, and extends sufficiently downward over the sac. This is rapidly deepened over the whole length of the canal, thus freely exposing the aponeurosis of the external oblique muscle. The superficial layers of the sac are now cleared away, and the two pillars are completely exposed the entire length. The sac is still covered below the external ring by fascia, which is now opened. The scissors are pushed under, and the canal is split a little beyond the outer edge of the internal ring. The deeper coverings of the sac are now dissected off, this being best and most rapidly accomplished with the fingers. If now the transversalis is removed high up in the canal, it is quite easy to separate the cord from the sac. The cord now being separated from the sac a little within the abdomen, the whole sac is dissected out and lifted up. In some cases, as in congenital hernia, the sac must be cut away from the cord. The sac is now opened, and if intestinal contents are present they are reduced; if omentum, it is ligated, and cut away. Adhesions are broken down if any are exposed. The sac being now held up from the internal ring, the operator inserts one or two fingers through the neck a little way into the peritoneal cavity, to guard positively against return of a piece of omentum or intestine into the sac during the placing of the ligature. The ligature is placed about the neck of the sac at the highest point, the level of the peritoneum, drawn very tightly, and the part cut away. There is then a wound, the upper wall of which is formed by the edges of the skin, superficial fascia, external oblique aponeurosis, and conjoined tendon, while the lower wall is formed by skin, superficial fascia, and a strip of aponeurosis or Poupart's ligament, including the outer pillar. The aim being to secure granulation to the bottom, it is not sufficient simply to pack the wound. Stitches are inserted, from four to eight in number, according to the size of the wound, to bind together the tissues which form the upper wall, and two or more tension sutures carried across the wound. The wound is now carefully irrigated, and dusted with iodoform throughout, and iodoform gauze is firmly packed the entire length down to the posterior wall. The scrotal or labial wound is sewed up, without packing. Proper dressing is applied to prevent soiling of the wound. The dressing is changed once in four or five days. A clear scar forms in from five to six weeks, and is very strong. The patient is not afterwards allowed to wear a truss or support of any kind, as pressure by a truss is regarded as injurious to scar tissue.

"Dr. McBurney has done the operation thirty-six times in inguinal hernia. One patient, an old drunkard, died in delirium tremens. In only one has there been a relapse of the hernia, and that can be easily accounted for by a defective operation. The first operation was done only two years ago, consequently the time may not be long enough to convince some that the cure is permanent.

"The paper was discussed by Drs. L. A. Stimson, A. G. Gerster, Abbe, McCosh, Hartley, Syms, Gibney, and Murray, most of whom had performed the operation and preferred it to any other."*

ETHYLENE BROMIDE—A NEW REMEDY IN THE TREATMENT OF EPILEPSY.

DR. J. DONATH recommends ethylene bromide as a substitute for potassium bromide in the treatment of epilepsy (*Pharmaceutische Post*, June 14, 1891). The long-continued use of bromide of potassium entails a series of unpleasant after-effects, which

* Report of meeting of New York Academy of Medicine (*Medical and Surgical Reporter*, March 9, 1889).

are manifested in disturbed action of the skin, mucous membranes, and general nutritive processes, which are generally attributed to the action of the potassium; and Dr. Donath believes that in ethylene bromide he has found an organic combination in which the action of the bromine is accentuated and more readily and more powerfully exerted than in any bromine combination as yet known. He reports in detail in the *Therapeutische Monatshefte* for June, 1891, ten cases which have been under observation for several months, which show that the use of ethylene bromide so far reduces the convulsive attacks as to make them of more seldom occurrence and of such slight severity that even when they were not entirely prevented they were so reduced in intensity as to exist simply in the form of more or less slight muscular contractions without loss of consciousness.

Ethylene bromide occurs in the form of a light brownish-colored liquid, with an odor somewhat similar to that of chloroform, and a taste which is at first sweetish, and becomes afterwards burning. At the freezing-point it solidifies into a snow-white crystalline mass; it boils at 300° C. Its specific gravity is 2.163, and it contains 90.9 per cent. of bromine. This fluid is insoluble in water, but readily mixes with alcohol and oil, and may be readily administered in the form of an emulsion. Dr. Donath recommends its administration in milk, his favorite formula being

℞ Ethylene bromide,
Spirits of wine, āā ♏xxxii;
Oil of peppermint, ♏ii.

Of this, 5 to 15 drops may be administered two to three times daily, or it may be administered in gelatin capsules, in doses of 3 drops, mixed with six drops of oil of sweet almonds, of which, two to four may be taken two or three times daily, and, according to the author, it is likewise suited for subcutaneous administration in oily solutions. The dose may be increased progressively until 70 drops is reached, the dose for adults two or three times daily, or 10 to 20 drops for children. It should be remembered that a minim contains a little more than two drops of the ethylene bromide.

Before proceeding to the therapeutic use of this substance, Dr. Donath tested it on himself, and found that in ordinary therapeutic doses it produces no evident effects whatever in a healthy individual, and only in very large doses did it cause some nausea. Most of the cases of epilepsy in which he tested its therapeutic power were cases of long-standing, which had for years been under the influence of potassium bromide. Twenty-one such cases were treated, but only notes of ten are referred to in detail, as the others were under observation too short a time to attempt to form reliable conclusions.

This substance should not be confounded with the bromide of ethyl, the anæsthetic, which has the formula C_2H_5Br. Ethylene, or olefiant gas, has the formula C_2H_4, and originates when alcohol is heated with concentrated sulphuric acid. Ethylene unites with two atoms of bromine to form a chemical compound analogous to ethylene chloride ($C_2H_4Cl_2$), which, under the name of Dutch liquid, was for some time used as an anæsthetic.

Reports on Therapeutic Progress.

THE TREATMENT OF PHARYNGEAL DIPHTHERIA BY SUBMEMBRANOUS INJECTIONS.

At the meeting of the American Medical Association, Dr. A. Seibert, of New York, reported thirty-five cases of pharyngeal diphtheria treated by submembranous injections, with a demonstration of the methods employed (*Medical Record*, June 6, 1891). His instrument was virtually a hypodermic syringe, having a long nozzle terminating in a hollow plate. At right angles to the latter were several very short ordinary hypodermic needles not over one-eighth of an inch long. The long nozzle could be bent on its axis at various angles, so as to fit the different portions of the throat. His fluid was the aqua chlori of the United States Pharmacopœia. Pharyngeal diphtheria was at the start always a local process. The bacilli gained access to the deeper mucous layer alone, or with streptococci, causing the exudate. The false membrane was to be regarded as the result of this action rather than as the disease itself. The treatment should be local, so as to kill the bacilli early, before they became so deeply embedded as to become beyond the reach of our antiseptic fluids. Giving bichloride by the stomach was useless. To remove the membrane and rub in the same solution hurt the sound epithelium, and the bacilli were thereby only rubbed deeper into the tissues. Chlorine-water (from one-quarter to one-half a syringeful) was easily injected over the minute spots which were seen during the early stage of the disease. In only one case had the gag been required.

The chlorine was penetrating and attacked bacteria and all organic matter. It was better to inject deeply. It was believed that where the membrane was of a dirty, sloughing nature, there were more streptococci than bacilli present. The injections should be made on an empty stomach. The pain was slight. A mouth-wash was subsequently used of iodine and carbolic acid, and an ice-bag was placed over the neck. Food and stimulants were given as usual. While during the day the child might be disturbed frequently for the various procedures necessary, it should be allowed to remain undisturbed from midnight till 6 A.M. All of his cases were at least three days old. The membrane remained for from two to four days, but it came away mechanically under the influence of the mouth-wash. He had lost only two cases out of the thirty-five, one from heart-failure and tracheo-bronchial diphtheria which had come on before he saw the case, and the other had been improperly treated by the attendants. Cultures made in ten cases showed the Loeffler bacillus in each instance. Not one of the favorable cases had any subsequent paralysis, because the early germicidal action of the remedy prevented ptomaïne formation.

THE EMPLOYMENT OF THE LEAVES OF THE COMBRETUM RAIMBAULTII IN THE TREATMENT OF BILIOUS HÆMATURIC FEVERS.

In *Les Nouveaux Remèdes* for May 24, 1891, PROFESSOR HECKEL writes that he recently had sent to him leaves of a plant, which on the western coast of Africa enjoyed a great reputation among the aborigines as a remedy for hæmaturic bilious fever. Among the natives speaking the *Soso* tongue this plant is known under the name of *kinkèlibah*, and is used by the natives in bilious fever, colic, and for the arrest of vomiting, employing a decoction of the leaves. Professor Heckel gives an account of some observations made by a medical missionary, named Raimbault, in which several cases are detailed where this substance was employed, from which the conclusion was drawn that the *kinkèlibah* is an active tonic; that it is a diuretic; that it is at first an emetic and then tends to prevent emesis; that it sometimes produces marked bilious diarrhœa.

Professor Heckel subjected the leaves to chemical analysis, and found that the principal constituents were tannin in extremely large amount and nitrate of potassium; and although these leaves are supposed to possess cholagogue properties, no principle was detected which could justify this assumption. It is evident that the claimed tonic and diuretic properties are apparently justified by the presence of tannin and the nitrate of potassium, while its chemical composition gives no plausible explanation of its other alleged virtues.

THE ACTION OF THE VAPOR OF ETHEREAL OILS ON BACTERIA.

Nothwithstanding the researches of Schultz, Koch, Schill, Fischer, Riedlin, Chamberland, and Braddon, the action of ethereal oils in a state of vapor upon bacteria is by no means well known. As this is a subject which bids fair to have practical interest for the physician as well as for the bacteriologist, a somewhat elaborate research by DR. OMELCHENKO, which is published in the *Krach*, is a welcome addition to our information. Its details must have been very carefully planned and carried out, for it gained the Pirogoff gold medal of the University of Kieff. The observations were made upon cultures of the bacilli of typhoid fever, phthisis, and the Siberian sore (anthrax) by passing over them with the help of the aspirator a slow but continuous stream of air saturated with the vapor of certain ethereal oils, and noting the time which each different vapor required to destroy the bacilli; the quantity of each oil used and the volume of air passed over each tube, as well as the amount of each vapor which the air was capable of holding, were also noted. It was found that if the air was not quite saturated, the effect was very markedly diminished. The bactericidal properties of the different oils were found to be greatest in oil of cinnamon, after which the others may be arranged with reference to their bactericidal power in the following descending order: Oleum fœniculi, oleum lavendulæ, oleum caryophyllorum, oleum thymi, oleum menthæ piperitæ, oleum anisi, oleum menthæ crispæ, oleum eucalypti globuli, oleum camphoræ japonicæ, oleum valerianæ, eucalyptol, French oil of turpentine. The oils of lemons and of roses had an exceedingly slight action. Bacteria in a dry state were much less easy to destroy than those which were in their natural state; a fresh condition of the sporules of the Siberian

sore, however, weakened the destructive effect of the vapor. It was found that the protoplasm of the various bacilli was affected in its chemical constitution in a constant manner for each kind of bacterium, losing its power of taking the stain. This change seemed to affect all parts of the organism equally. The death of the bacteria was shown both by this loss of capacity for taking the stain, and also by the tendency to assume a granular condition. Tables are given of the experiments, from which we see that oleum cinnamomi and oleum valerianæ took the same time to destroy the bacilli of typhoid fever,—viz., forty-five hours; but, inasmuch as each litre of air took up only .0005 gramme of the former, as against .0082 of the latter, the total quantity of cinnamon oil used being .0646 gramme, while 1.0429 grammes of the oil of valerian was required, it is evident that the former deserves the higher place in the scale of bactericidal substances. Experiments by previous writers made with emulsions of ethereal oils placed in contact with bacterial cultures have not generally shown that these possessed a high bactericidal capacity, and Dr. Omelchenko found that when he passed the air through emulsions instead of through the oils themselves the amount taken up was materially less than in the latter case, and so it would appear that the bactericidal capacity of any one of these substances depends largely upon its volatility.—*Lancet*, April 4, 1891.

ON THE MODE OF ELIMINATION OF IRON SALTS.

With most ferruginous preparations, administered by the mouth, the greater part of the iron can be found in the fæcal matters, and the question at once suggests itself, Is this a sufficient reason for concluding that the iron has not been absorbed. Evidently not. But to make this conclusion legitimate, it must first be demonstrated that the iron is not eliminated by the intestinal mucous membrane after having been absorbed from the gastro-intestinal canal. This demonstration has been accomplished by DR. JACOBI (*Gazette Médicale de Paris*, May 23, 1891). He has proved that, after the injection of the salt of iron, after a few hours only a small part (about ten per cent.) is eliminated with the urine, the intestinal secretions, and the bile, while the major portion—about fifty per cent.—is deposited within two or three hours in the liver, in the spleen, kidneys, and intestinal wall. In these experiments Dr. Jacobi employed the neutral double tartrate of iron.

RESECTION OF THE LUNG.

According to the Paris correspondent of *The Medical Press and Circular*, June, 1891, M. TUFFIER presented at the last meeting of the Société de Chirurgie, a patient on whom he practised in March last excision of the summit of the right lung for localized tuberculosis, and gave the details of the operation. Before attempting the extirpation of the parenchyma of the lung, M. Tuffier made several experiments in the amphitheatre on ligature of that part of the organ. Through a small intercostal incision he tried to separate the pleural covering from the lung and get a ligature around it, but although he found it easy enough to detach the pleura above, in front, and behind, it was not so on the inside, and as the thoracic duct and the phrenic nerve are intimately attached at that point to the pleural layer, he was afraid of including them in the ligature, and consequently abandoned all attempt in this direction, and decided on performing resection of the diseased parts. And this decision gave rise to a series of questions to which he could not find a satisfactory answer at the moment. How would the lung-tissue bear a ligature? What are the mode and rapidity of reparation of the loss of substance? What should be feared from the innumerable vessels of the organ? How would the void left in the thoracic cavity be filled? In order to fix himself on these important points he resected the summits of the lungs of several dogs, and the result of his experiments was that the wound rapidly healed, and that the void was quickly filled by expansion of the parenchyma, provided the part resected was not too considerable.

His first patient was a man on whom in November last he performed the radical cure for hernia of spontaneous origin. The tumor occupied the sacral intercostal space. When he had made the incision he detached the pleura with his finger, and pushed it up to the summit, and explored the region, as the man's appearance was such that tuberculosis was suspected. The lung felt velvety to the touch, and if any induration had been present it would have been easily detected. The wound was then closed, and in a week the patient was cured of his hernia, and experienced no inconvenience from the exploration.

In a second patient resection was really practised. The man was 25, of stout build, and enjoyed perfect health until two months ago, when he was attacked with cough, night-sweats, and tuberculous laryngitis, and for which he entered the hospital. Auscultation revealed the following symptoms: At the top of the right lung dulness, respiration rude and jerky, expiration prolonged, and dry crepitation in coughing; the left lung was perfectly healthy, and the patient, being made aware of his condition, accepted the risks and perils of operative interference, especially as medical treatment but little changed his condition. The *modus operandi* was as follows: A cushion being placed under the back so as to efface as much as possible the subclavicular fossa, an incision was made through the second intercostal space to within half an inch of the sternum, the great pectoral and the intercostal muscles were similarly incised, and the pleura brought to view, which being cut in turn the tissue of the lung appeared. The operator then passed in his finger and detached the serous membrane above and without with comparative ease, but when he reached the inside the membrane yielded, and immediately a hissing sound occurred, indicating an escape of air or the formation of a pneumothorax. The finger was applied to the spot, and subsequently a plug of iodoform gauze. Continuing the operation, M. Tuffier passed his finger behind the summit of the lung, and, seizing the tissue with a special flat forceps, drew it forward, threw a ligature around it, and fixed the pedicle to the periosteum on the internal side of the second rib. The muscles were then sutured, and the wound dressed with iodoform. The piece resected was examined, and in its centre was discovered an induration of about the size of a small walnut, and surrounded with tubercles, in which bacilli existed. The man made a rapid recovery, and a minute auscultation of the lung showed that the respiratory murmur, although a little weakened, was present throughout the whole organ without revealing the slightest sign of a pleural effusion.

THE ALKALOID OBTAINED FROM THE TUBERCLE BACILLUS.

Great interest is naturally attached to the various experiments which have been made in regard to the pathological chemistry of the tubercle bacillus. Although we are now in possession of a pretty full knowledge of the mode of action of the products of the tubercle bacilli as exhibited by the recent experiments made in all parts of the world with tuberculin, we as yet know comparatively little of the chemistry of this substance. An alkaloid was obtained from the products of the anthrax bacilli by Dr. Sidney Martin, and PROFESSOR ZUELZER has succeeded in obtaining a similar body from the bacillus of tuberculosis. A short account of Zuelzer's mode of isolating the alkaloid is given in the *Wiener Medicinische Wochenschrift*, No. 10, 1891. The entire contents of the tubes in which the pure cultures were made were repeatedly treated with hot water acidulated with hydrochloric acid. The solution was filtered, evaporated, and then several times precipitated with platinum chloride; the double salt decomposed by sulphuretted hydrogen, and the liquid again filtered and evaporated to dryness. In this way an almost white crystalline salt was obtained, which was easily soluble in hot water, but with great difficulty in cold. Its solution was light yellow in color. After keeping for some time, the dry salt assumed a light-brown color. The chloride when injected into rabbits and guinea-pigs exhibited a characteristic toxic action; about one centigramme injected subcutaneously produced after from three to five minutes an increase in the frequency of respiration, the movements reaching 180 per minute. This continued for about a quarter of an hour, when the rate gradually became slower. The temperature rose in two out of the ten observations from normal to 100.2° F. Another constant symptom was well-marked protrusion of the eyes, which also appeared bright and shining, with somewhat dilated pupils. The sclerotic was considerably injected. It was remarkable that the protrusion of the eye was more marked on the side on which the injection had been made than on the other. All these appearances disappeared in from fifteen to twenty minutes. Toxic symptoms only showed themselves in three rabbits, and these had received somewhat larger doses, between 2 and 3 centigrammes having been administered. Death usually occurred somewhere between the second and fourth days. At the site of injections there was considerable redness, and small hemorrhages were found in the muscles immediately beneath. Small effusions of blood were also found in the mucous membrane of the stomach and small intestine. In two cases effusion occurred into the abdominal cavity. The brain was, as a rule, soft and congested. Almost precisely

similar results followed the injection of the alkaloid into the conjunctiva.—*Lancet*, April 11, 1891.

THE ADVANTAGE OF COMBINING IODINE WITH GLUCOSE.

The remedial value of iodine is well known. But it is also a fact that full doses cannot be administered internally except in the form of iodide of potassium. As a rule, in the various forms of disease to which free iodine is applicable any combination having an alkaline base is not desirable. In order to secure the specific action of a remedy adapted to relieve chronic disorders, and it is to this class of diseases that iodine is chiefly applicable, it is important that it should be to a certain extent cumulative and retained in the circulating blood for a sufficient length of time to exert its specific action upon diseased tissue. In glucose we have an agent capable of absorbing, or rather of occluding, free iodine so that this metalloid cannot be detected by either odor or taste, and thus combined can be administered in much larger doses than formerly employed without producing unpleasant symptoms. Another advantage in giving iodine occluded by glucose is found in the fact that as this substance occurs normally in the contents of the small intestine, in the chyle after the use of amylaceous and saccharine food, in the blood of the hepatic veins, and in the tissue of the liver in the form of glycogen, it is probable that glucose in thus occluding free iodine is itself protected from chemical change during the process of digestion by the antifermentative quality of the latter, and hence may be readily absorbed into the circulation, carrying in its embrace the iodine to be liberated during the morphological changes that occur prior to the formation of new blood-corpuscles. In the formula, thirty grains of iodine are dissolved in four ounces of water by means of one hundred and fifty grains of potassium iodide; to this solution is added twelve ounces of syrup as prepared by the sugar-refineries and sold by grocers under the name of golden syrup, or sugar-house syrup, or molasses. This syrup contains glucose in combination with organic matter, and answers the purpose quite as well as glucose manufactured from starch by the action of sulphuric acid, or other glucosides furnishing this substance in an isomeric form. In the *Medical Record* for June 13, 1891, DR. F. P. MANN gives the following formula as representing the best combination for iodine and glucose, with the caution that simple syrup must not be substituted, for this, containing entirely crystallizable sugar, will not take up the iodine, and the result will be a strong solution of iodine, which cannot be taken without serious inconvenience. Dr. Mann writes that he has produced the most satisfactory, even remarkable, results, where potassium iodide or syrup of the iodide of iron had signally failed, with the following formula:

℞ Iodinii, ʒss;
Potass. iodidi, ʒiiss;
Aquæ puræ, ʒiv;
Syrup. fuscus, ʒxii;
Ess. gaultheriæ, ʒii. M. Fiat sol.

Sig.—Take a tablespoonful between each meal with a little water. (Syrupus simplex must not be used.)

He advises when using this formula to keep the preparation for about twenty-four hours before commencing its use, as from six to ten hours are required in which to completely occlude the free iodine. He adds that a larger proportion of the free iodine can be given than the above, and the preparation of the free iodine can still remain odorless and tasteless so far as free iodine is concerned; though where a stronger combination is employed it would be advisable to commence with a smaller dose and increase it gradually.

ALBUMINURIA IN PERSONS APPARENTLY HEALTHY, AND ITS RELATION TO LIFE INSURANCE.

In the *Medical Record* for June 13, 1891, DR. WILLIAM B. DAVIS publishes a paper read before the Association of Life Insurance Directors at their meeting held in New York on May 29, 1891, concluding with the following general rules:

General Rules.—1. There should be nothing in the family history indicative of heredity of Bright's disease, and there should be no symptom of renal disease in the personal history except albuminuria.

2. The candidate should be under forty years of age, in good health, and there should be no history of gout, rheumatism, syphilis, lead-poisoning, nephritis, intemperance, chronic dyspepsia, or dropsy.

3. There should be no indication of hypertrophy of heart or increased arterial tension, no accentuation of the aortic second sound, and no palpitation or dyspnœa.

4. There should be no retinal changes.

5. The color, density, and quantity of the

twenty-four hours' urine should be normal, or it may be darker in color and heavier in density.

6. The specific gravity of the twenty-four hours' urine should not be below 1.020. It may range from 1.015 to 1.030.

7. The precipitated albumen should not exceed one-eighth of the urine.

8. There should be a period of the twenty-four hours when the urine is free from albumen.

9. The urine, as a rule, should contain no tube-casts. When, however, the specific gravity and quantity of urine are normal, the presence of a few hyaline casts have no serious import.

When the above conditions have been met, and we are convinced of the ability of the medical examiner, and are satisfied with the completeness and carefulness with which the investigation of the case has been made, I think we can safely approve the candidate for a short endowment policy.

To a person who has passed the above gauntlet and been subjected to a rigid medical examination, this action will doubtless appear illiberal, but until the clinical significance of albuminuria in persons apparently healthy has been finally determined by observations upon one full generation, we cannot, and probably ought not, to expect life assurance companies to do any better for them.

TREATMENT OF DIPHTHERIA.

Dr. Guntz, of Dresden, has had great success in the treatment of diphtheria with bichromate of potassium in water containing carbonic acid, which he has found by numerous experiments on animals, as well as in the course of extensive clinical observations, to be entirely harmless. For an adult six hundred grammes (about a pint) are ordered per diem, in which are dissolved three centigrammes (about half a grain) of potassium bichromate. The whole quantity is directed to be taken in about half a dozen doses, regarding which it is important to observe that they must not be taken on an empty stomach; a little milk or gruel should, therefore, be swallowed before each dose. Children, of course, take smaller quantities, according to age. They can be given the medicine in a tumbler, mixed with some fruit syrup, and they do not generally object to it. At the commencement of the disease, Dr. Guntz washes the [illegible] out with a one per cent. solution of permanganate of potassium containing one per cent. of thymol, or with a corrosive sublimate solution of the strength of 1 in 3000, taking care, in the latter case, that none is swallowed, and that the mouth is well rinsed with water afterwards. In the case of young children, the pharynx must be brushed out with the solution. Sometimes iodoform is employed, being applied on the tip of the finger to the affected spots. Dr. Guntz specially remarks that potassium bichromate, though harmless in the way described, is by no means so when in pills, powders, or in solution in non-carbonated water.—*Lancet*, March 28, 1891.

DRAINAGE IN ABDOMINAL SURGERY.

At the meeting of the New York Academy of Medicine, held May 19, 1891, Dr. D. P. Allen, of Cleveland, Ohio, in a paper with this title, considered the subject under three heads (*New York Medical Journal*, June 13, 1891).

The first proposition was as to whether drainage of the abdomen after operation was ever desirable. He presumed that in these and all kindred operations the use of the drainage-tube had considerably diminished. He very rarely used it, seeking, in amputation of the breast or limbs, to stop all oozing before closing the wound, to keep it strongly pressed together during the insertion of the sutures and the application of the dressings, and by the pressure of the dressings so to hold the surfaces in apposition as to obviate the collection of secretion. By this method the rule was to secure union by first intention without the drainage-tube. The same conditions existed to a degree in the abdominal cavity, and that its surfaces came in contact was, he thought, evidenced by the fact that in attempting to insert the hand into the abdominal cavity, especially if the anæsthesia was not complete, the omentum and the intestines inserted themselves between and separated the fingers in spite of the operator's efforts to prevent this. Notwithstanding, however, the close apposition which existed between the abdominal viscera on account of the intra-abdominal pressure produced by the tonicity of the abdominal wall and the distention of the intestines by gas, accumulations of fluid took place in the abdominal cavity. A common instance of this was ascites. Doubtless, after laparotomy, fluids might collect in the abdominal cavity, in spite of the apposition of surfaces and the

existing pressure, but he strongly suspected that this occurred chiefly where there was bleeding from vessels of some size, or where the pre-existing condition of the peritoneum was such as favored the pouring out of fluid. His observation would lead him to doubt whether the collection of fluid was, as a rule, great under other circumstances, unless sepsis was present or strong antiseptic solutions were employed. While on the one hand it must be acknowledged that by apposition and pressure we could not escape the collection of fluids in the abdominal cavity to the degree which might be done in wounds more subject to pressure, on the other hand the lining membrane of the abdomen was especially able by its power of absorbing fluids to care for and remove accumulating secretions. If, then, there were certain forces tending to restrict the accumulation of fluid in the abdominal cavity and also a well-marked force for removing such accumulations when they occurred, the question arose as to what fluids might safely be left in the abdominal cavity to be cared for by natural means and what ones must be artificially removed. Those fluids which could be safely left to care for themselves were (1) serous oozing from wounded surfaces and (2) small amounts of blood collecting from the same sources. Those which it would be dangerous to leave were (1) large amounts of blood and (2) septic or infectious material. That collections of serum were readily absorbed from the abdominal cavity was unquestionable. He believed the same to be true of small collections of blood. Beyond question, however, the leaving of large amounts of blood to become organized was fraught with danger, since blood-clots seemed particularly susceptible to infection and decomposition, and patients weakened by the loss of blood had less power to resist a slight degree of infection, which they might do under more favorable circumstances.

The question now arose, Had we means of drainage efficient in removing fluids which might collect in the abdominal cavity. He had been surprised in many cases where he had used the drainage-tube to find how small an amount of fluid escaped from it. Doubtless there were instances in which the amount of fluid drawn away from the abdomen by drainage was very great. Though he could not demonstrate it to be a fact, he surmised that cases in which large amounts of serum were removed by the drainage-tube were those in which there was a tendency of this fluid to accumulate before the operation, and that the fluid was not the product of divided adhesions.

Evidently it would be impossible to discuss all conditions which might arise. We might, however, discuss those which were most common. Perhaps this could be done most rapidly by citing briefly, in connection with some of these conditions, a few cases. As to the cases in which drainage should be employed: The abdominal cavity should be drained (1) in septic peritonitis. Wherever found, septic matter should be removed, and this was nowhere truer than in the abdominal cavity. It should be effected in any direction requisite for its perfection, whether ventral, vaginal, or lumbar. 2. In gunshot wounds drainage was rarely indicated. In the few cases he had seen he had been surprised at the small amount of extravasated fæcal material, even when the lumen of the gut was largely destroyed. All that could be accomplished would be gained by thoroughly cleansing the abdominal cavity without drainage, for it would be difficult by any arrangement of drain, unless it was the tampon of Mikulicz, to procure drainage in these cases. 3. In tubercular peritonitis, when the fluid produced by the tubercular process was contained in a cavity occupying the pelvis and the lower part of the abdomen, and was shut off from the upper portion of the abdomen by adhesions among the intestines, he could not imagine that such cavities could be successfully treated in any other method than by drainage. 4. Operations for perityphlitis. Where pus was present, and where adhesive inflammations had prevented its invasion of the general peritoneal cavity, drainage was, of course, in place. Where the infection had generalized itself over the abdomen, the treatment must be the same as for septic peritonitis from other causes, and thorough cleansing and drainage were indicated. 5. Intestinal obstruction, whether the result of volvulous adhesions or constricting bands, was in early stages often accompanied by the effusion of serum. Afterwards this disappeared, became absorbed, and there remained plastic lymph, gluing the intestines together. If operation was done early in these cases, the serum was, he thought, not septic, and did not require drainage. Although he had not seen enough of these cases to reach a definite conclusion, the impression had grown upon him that in an early stage, when free fluid was present in the abdominal cavity, they were favorable for operation, and that this fluid was not septic and did not need to be drained away. Sub-

sequently, when the fluid had disappeared, there was a deposit of plastic lymph with adhesions and infection, rendering operation more dangerous and drainage important. 6. Hemorrhage. When this occurred in considerable quantities and could not be controlled, it was, doubtless, best that it should be removed. It was, however, better to take good care that much hemorrhage did not occur than to seek to escape its dangers by drainage. 7. Extrauterine pregnancy. In operations for this condition there were cases in which it was impossible to control bleeding, and in which drainage was important. If the operation was upon the tube which had just ruptured, and the tube and blood could be thoroughly removed, drainage might or might not be employed, according to the completeness of the operation. But there were many cases in which the products of the extrauterine gestation could not be completely removed, or in which the removal of the adherent placenta would be unwise, in which drainage must be employed. 8. Adhesions. It was the speaker's belief that divided adhesions did not furnish in themselves cause for drainage. Uncontrolled hemorrhage was, as had been stated, a cause for drainage, but not the adhesions in themselves. In some cases of ovarian tumors of enormous size, where the adhesions had been universal and dense, and where their division had been accompanied by extensive hemorrhage, he had tied all bleeding points, at times applying cloths wrung out with hot water, well up to the base of the mesentery in the lumbar region, and had closed the abdomen without drainage, and the patients had made a complete and uninterrupted recovery. 9. The escape of cyst contents into the abdominal cavity. When this occurred and the material was infectious, no precaution for its removal could be too great, and, in addition to washing, drainage was doubtless in place. In other cysts he did not believe this necessity existed. The contents of simple ovarian cysts seemed to be innoxious. He had had a large amount of fluid from a cyst of the pancreas escape into the abdomen, which had been removed by washing without drainage, in which recovery had resulted. 10. Pyosalpinx. Opinions differed more with reference to the drainage-tube in this than in any other disease. If pus-tubes could be removed without rupture and the uterine extremity of the tube be disinfected or seared with the actual cautery, drainage was unnecessary. If, on the other hand, pus escaped or we were uncertain as to infection, or if a part of the ruptured tube should remain, it would be wise to drain. 11. Pelvic abscess. In this condition not only should the pus be removed at the time of operation, but the escape of that which formed subsequently should be secured by means of drainage.

What method of drainage should be employed? Vaginal drainage, which had been much employed, was now largely discarded. The two methods now generally used were with the drainage-tubes placed in the abdominal incision, and with the tampon of Mikulicz. The former was of more universal application, being especially fitted to prevent the accumulation of fluid in the pelvis. The Mikulicz tampon was especially effective for those cases where localized septic infection took place, as in pelvic abscess, ruptured pyosalpinx, and advanced extrauterine pregnancy.

THE TREATMENT OF OSTEOMALACIA BY CASTRATION.

HOFMEIER (*Centralblatt für Gynäkologie*, No. 12, 1891) reports the case of a virgin, aged 30 years, who had osteomalacia of three years' standing, the disease being progressive at the time of operation, as shown by the presence of severe pains in the pelvic bones, inability to walk, and marked pelvic deformity. Menstruation regular and painless. Four weeks after removal of the ovaries, the patient could walk without assistance, and the pains were much less severe. She received cod-liver oil and peptonate of iron; six weeks later she felt quite well, had no pain, and could walk a long distance. The pelvic organs were normal. The ovaries were atrophied, as in a woman after the menopause, and presented a similar appearance microscopically, only a few ovisacs being seen. The case was interesting, not only because the patient was a virgin (hence pregnancy could not be regarded as an etiological factor), and there was no disturbance of menstruation, or evidence of pelvic congestion.

As regards the effects of castration under such circumstances, the writer admits, with Fehling, that it is impossible to give a satisfactory explanation. It may be due to some reflex action upon the vaso-motor nerves supplying the nutrient vessels of the pelvic bones, the disease itself being regarded as a trophoneurosis of the bones directly dependent upon ovarian activity. This theory receives additional support from a similar case reported by Truzzi. Fehling has collected twenty other

cases of castration for osteomalacia, in none of which was there a failure on the part of the operator to secure at least a temporary benefit.—*American Journal of the Medical Sciences*, July, 1891.

THE TREATMENT OF ERYSIPELAS.

In the *American Journal of the Medical Sciences* for July, 1891, DR. CHARLES P. ALLEN publishes his conclusions as to the best method of the treatment of erysipelas, based upon his personal experience in the treatment of fifty-six cases and the reports of four hundred and sixty-six cases occurring in the Charity Hospital, New York. In the first place, he recommends internally such symptomatic treatment as the nature of the case seems to require. Antipyretics only in case of high or persistent fever (over 103½° to 104°); then antipyrin in dose of at least gr. xv to xx for an adult, guarded by alcohol; cooling drinks. Calomel or saline aperients in full dose if constipation. If much weakness, alcoholic drinks given freely, especially at critical periods, and iron or iron and quinine; digitalis if much fever and prostration; bromide for delirium; antipyrin or phenacetin for headache, with cold applications to head, and as concentrated and nutritious a diet as possible.

Second, locally, he paints the patch and surrounding margin of the healthy skin thickly with ichthyol in collodion, ʒi to ʒii to ʒi. If the scalp is the region affected, a watery solution or ointment of ichthyol can be employed. To arrest the spread, he makes an attempt either with the band of adhesive plaster or by scarification, or both, the latter to follow the former, in case the disease spreads beyond the adhesive strips. In erysipelas of the face, which had not yet reached the forehead, or at least its upper part, he would apply a band tightly about the forehead and just above the ears, cutting the hair in a strip around if necessary to secure firm pressure. The chances of arresting the process here should be at least equal to those of checking the spread upon an extremity, for we have a hard bony base over which to make our compression. If the boundary is passed, then he should at once have the scalp shaved and apply another band higher up. The hair should be cut in any case in which the scalp is invaded or threatened. Then the same application of ichthyol in collodion can be made, as to the face or other part. If there be much tension, swelling, heat, and discomfort (which is not apt to be the case under collodion), any oily substance can be applied over it.

In treating erysipelas, the uncertainty of *prognosis* must always be kept in mind. Cases, to all appearances mild in the beginning, may become severe and prove fatal, while formidable-appearing areas may suddenly cease spreading spontaneously. It is scarcely more safe to say a case will progress favorably (though the great majority do) than to claim that the particular line of treatment instituted has prevented an unfavorable termination, or proven abortive, unless a whole series of cases under a given method have terminated in a shorter than the average time.

Naturally, when the erysipelatous process has its sources in a pus collection, such as an abscess, pustule, ulcer, foul wound, carious tooth, diseased duct, etc., the first care must be to secure as prompt and thorough disinfection and cleansing as possible. Pus must be destroyed and purity maintained. A solution of the peroxide of hydrogen will often be found useful in effecting this purpose. In such case a spontaneous halt may be hoped for. In the same way a diseased mucous membrane must be cared for; excoriations, ulcerations, rhinitis, or other disease of the nasal mucous membrane or affection of the throat must be looked after. It is probable that every case of facial erysipelas starts from local solution of continuity either upon the skin or adjacent mucous membranes, and we simply call some cases "idiopathic" or "genuine" when we fail to find the point where the micrococci have entered.

As a prophylactic measure in those predisposed to repeated attacks, great care should be taken to discover and cure affections of mucous membranes, carious teeth, ulcerations, or other disease processes or conditions as possible means of maintaining the tendency. Recurrences after apparent cure must be kept in mind and treatment continued sufficiently long to prevent them.

ASTHMA IN CHILDREN.

DR. R. BLACHE (*L'Union Médicale*, 1890, No. 133) defines asthma as a bulbous disease, in which attacks are produced by impressive irritations of the vagus or peripheral nerves, particularly the trigeminus; the reflex action manifests itself by successive or simultaneous spasms of all the intrinsic inspiratory muscles.

intercostals, scalenæ, trapezii, etc., and by a tetaniform contraction of the diaphragm.

Blache thus classifies the disease into three forms,—pneumobulbous asthma, essential or nervous asthma, emphysematous or alveolar asthma, catarrhal or bronchitic asthma.

Nervous asthma governs all asthmatical pathology of children. A class of asthma in infantile pathology which holds a place whose importance increases every day as the pathogeny of the affections are better known, is the class of reflex asthmas in general; these are the cases in which the bulbous irritation does not leave the broncho-pulmonary filaments of the pneumogastric. The bulb is then impressed by an excitement springing from all the peripheric branches of the vagus, but again from the other nerves,—as the trigeminus and the cutaneous nerves,—so that nasal asthma, pharyngeal asthma, amygdaline, gastric asthma, and cutaneous asthma belong to the category of dyspnœas. Nasal asthma has only been known a few years; Voltolini, in 1874, published the first facts relating to mucous polypi determining the approach of transient dyspnœa. Mucous polypi are rare in children; but, on the contrary, adenoid tumors are very frequent and a usual cause of nasal asthma. Hypertrophic rhinitis is also a frequent cause; this may be a primary disease or follow successive attacks of acute coryza, or infectious fevers, as measles and typhoid fever; it may be secondary to another nasal lesion, malformation of the nose, deviating thickness of the partition, foreign bodies, affections of the naso-pharyngeal canal, catarrh, and adenoid growth. More than this, this rhinitis is at times connected with diseases which attack the stomach (Bouchard, Ruault), the intestines (Secchi, Buck), genital apparatus (J. Mackenzie, Joul).

When such a child, predisposed to bulbous irritability, either by diathesis or heredity, and to nasal erectibility following the preceding lesions, an attack of asthma may be brought on by congestion following cold, by the action of vegetable or animal powders, by the influence of odorous matters, by the contact of a probe on the pituitary gland, by an untimely nasal irrigation, and by remote causes, stomachic, intestinal, or genital excitations.

The treatment recommended for the attack is fumigation by belladonna cigarettes, henbane, or the leaves of datura, stramonium, nitre-paper, inhalations of oxygen, or ioduret of ethyl, but in many cases the hypodermic exhibition of morphine will be required to produce even momentary relief. In a general way, opium ought to be very prudently used with children; belladonna is much safer and can be used longer. Bretonneau and Guersant mix one centigramme of the extract to one centigramme of the powder of belladonna, giving this each day, and continuing for some time. The tincture of lobelia inflata may be given in a dose gradually raised from 20 to 100 drops. Moncorvo remarks that the endurance of children for the treatment permits him to raise the dose 10 and 12 grammes in twenty-four hours. Blache has obtained excellent results from tincture of grindelia robusta, which he gives to children in doses of from 15 to 60 drops. Inhalations of vapor of pyridine, advised by M. Sée, have helped Blache to lessen the force of the attack. According to Laborde and Daudrie, this substance lessens excito-motor force, dilates peripheral vessels, and has a paralyzing action on the vaso-constrictor nerves; hence, it increases the fulness of respiration, at the same time the respiratory movements regulate themselves and diminish in frequency. The curative treatment of asthma limits itself to the almost exclusive use of iodine, particularly the iodide of potassium. The anti-dyspnœic effects of this agent on the brain, and particularly on the bulb, are certain; Binz states that it paralyzes the nervous functions and produces narcotism; in every case it moderates the exciting power of the vital centre and regulates the distribution of the nervous influx.

Asthmatics presenting hyperæmia of the nasal mucous membrane are more easily affected with iodism. In cutaneous asthmas iodine may also be contraindicated as aggravating the skin condition. At times the emaciation and loss of strength make it necessary to interrupt the treatment. Pyridine by aspiration, tincture of grindelia, arsenic, and aerotherapy by compressed air are, then, the only means which remain at the disposition of the practitioner. The iodine treatment is applicable to non-diathetic asthma; it is contraindicated when the disease has a telluric or hereditary origin,—for example, in the arthritic or gouty,—a medication favoring incomplete nutrition or modifying the morbid secretions will be indicated. Asthmatics tainted with paludalism will require quinine in combination with iodide of potassium.

Blache agrees with Simon that the value of certain health-resorts cannot be overestimated; the former gives preference to the waters of Mont-Doré, stating that their sedative and decongestive properties have pro-

duced good results, particularly in the pneumobulbous form; in herpetic asthma children as well as adolescents will find the sulphurous medication good. Bigorre, Saint-Honoré, and Alevard may be recommended.—*American Journal of the Medical Sciences*, July, 1891.

THE MANAGEMENT OF LITHÆMIA.

At the meeting of the Post-Graduate Clinical Society, held March 28, 1891, DR. ANDREW H. SMITH read a paper on the "Management of Lithæmia" (*Post-Graduate*, July, 1891), in which he said that he did not think we could assume that there was such a thing as lithuria without lithæmia, although we may have lithæmia without lithuria, in the sense of a deposit of lithic acid or of lithates in the urine. Lithæmia might be a condition and not a disease. Thus, we might have an excess of lithic acid in the blood without any symptoms of disease accompanying it, and, if we considered this a morbid condition of the blood, it might come within the definition of a disease; but there are many people who constantly exhibit deposits of lithic acid or urates, and yet they are in perfect health; and, again, the condition is frequently temporary and dependent upon exhaustion from severe muscular effort or upon a transient indigestion. If a disease, there should be associated with the cases of lithic acid in the blood some symptoms. It was probable that so long as the uric acid was freely eliminated it might be formed in considerable excess without disturbing the system; but if, for instance, there were an acidity of the blood brought about by an imperfect digestion or assimilation, it would be possible for the acid to be precipitated in any part of the body, thus giving rise to disturbance of function of those parts. Where lithic acid was deposited in the tissues in combination with bases, we had the symptoms familiar to us in gout.

As to the diagnosis, Dr. Smith said we were apt to find a symptom group made up about as follows: The patient, without being positively ill, did not feel well, and suffered either from mental hebetude or from irritability; or there might be insomnia, digestive disturbances, increased after eating; generally there was constipation, frequently hemorrhoids, and often certain affections of the skin, such as lichen or eczema. Such patients frequently complain of giddiness and of specks before the eyes; but irritability of temper was a very prominent symptom; neuralgic pains, and aching and weariness of the limbs, are common. There is usually a deposit in the urine, either brownish or pinkish, consisting of crystals of uric acid, stained by certain coloring-matters in the urine, or of crystals of lithic acid in combination with sodium, ammonium, or magnesium. This deposit occurs when the urine cools, and redissolves on heating. It is not soluble in the acids, except sulphuric acid, but is readily soluble in alkalies; the urine is always acid, and it is this acidity which throws down the crystals of uric acid. From a clinical stand-point it was interesting to determine how far the uric acid was responsible for the symptoms which are associated with this condition. He thought we could hardly consider it settled whether the uric acid itself was the formation or the result. The determination of this question would probably involve the determination of whether uric acid was formed in excess, or whether, when in normal quantity, it is deposited under certain abnormal conditions. For instance, if there were imperfect digestion and malassimilation, with consequent throwing into the blood of the products of fermentation, the acids produced might cause the deposition of the uric acid. It was certain that these symptoms were not uncommonly met with without any marked deposit of uric acid or lithates in the urine. However, if this condition be attacked by remedies upon the supposition that uric acid is the foundation of the trouble, the treatment is usually successful. Besides the formation of bile, the liver has the glycogenic function, and functions connected with retrograde metamorphosis, and probably the failure of lithic acid to be oxidized into urea is due in part to the defective action of the liver. This conclusion would seem to be a fair one from a clinical stand-point, for mercurials and also nitric acid have a peculiar action on the liver, and are peculiarly efficacious in lithæmia.

Clinically, this condition is presented to us, first, among people who do not take enough exercise in proportion to their eating; and, secondly, in a class of persons who are moderate eaters, but are of a highly nervous organization, and in this class the symptoms usually develop as the result of nervous strain, long-continued anxiety, or mental labor. The importance of bearing in mind these two classes is evident in the management of these cases. In the first class we would employ vigorous purgation, whereas in the second class the treatment would be rather of a tonic nature.

Management.—First, as to the matter of diet. As uric acid is a nitrogenous substance, we would naturally think that it would be sufficient to deprive the patient of nitrogenous material; but the habit of excreting such material still continues, even though it be withheld from the dietary. It is like a spendthrift, who cannot be cured by withholding money from him; he must be educated to better habits. Just as the spendthrift will pawn his clothes to get money, so the system will pawn the tissues, so to speak, to obtain nitrogen. Formerly it was supposed to be essential to withhold nitrogenous food, but few insist upon this point now. The great point is to secure a diet which will be readily assimilated, no matter what its composition; for any other diet will inevitably result in the production of various fermentative products, acids, etc., which will derange the metabolic processes more than would result from a little, more or less, of some one constituent in the food. If the food occasions the patient distress soon after its ingestion, it can be assumed that the trouble is in the digestion of the albuminous materials. On the contrary, if the disturbance occurs later,—in other words if the indigestion be intestinal,—we may say in a general way that the difficulty is with the carbohydrates and the hydrocarbons,—the starches, sugars, and fats. The diet should be regulated tentatively, and then the further management of the case will depend upon which of the two classes the case belongs to. If the patient be plethoric, saline purgatives are valuable. Sir Henry Thompson considers the sulphate of soda particularly valuable, and he bases this view upon the fact that it purges by exciting elimination from the glandular structures, rather than by increasing peristalsis or osmosis, as is the case with the other saline cathartics; and, in addition to this, it acts decidedly upon the liver. A course of purgations with salines, or with Friedrichshall, Hunyadi, or similar waters, is appropriate for the first few days. After this nitric acid should be administered for a week or two, and then a persistent coarse of alkalies should be given. Alkaline waters present the alkali in an agreeable form, and they insure the patient's taking a large quantity of fluid, which is necessary in these cases in order to secure a thorough action of the kidneys and bowels. In this country the most decidedly alkaline is the Saratoga Vichy. Waters containing lithia are especially valuable, for the reason that a smaller quantity of lithium will neutralize a given quantity of acid than almost any other alkali or alkaline earth; thus, seven grains of lithium will neutralize as much acid as twenty-three grains of sodium or forty grains of potassium. The three prominent lithia springs are the Buffalo Lithia, Farmville, and Londonderry, the latter being the strongest. The waters should be taken for a long time, and in sufficient quantity to keep the urine very feebly acid.

Where the nervous symptoms predominate largely over the digestive disturbances, active purgation is not desirable; the object of treatment should be to conserve the deteriorated forces, and in some cases it has even been suggested that the patients should be kept in bed. Appropriate tonics are indicated. Lithæmia being a condition of imperfect oxidation, it may be said that free exercise in the open air is a *sine qua non* of treatment. Neurasthenic patients, however, will need the open air without muscular exercise, and, therefore, carriage-riding is appropriate.

One manifestation of lithæmia had come under the speaker's notice in which there were digestive disturbance, palpitation of the heart, and insomnia. This combination was most commonly found in the neurasthenic cases, and if their common origin is not recognized the patient is apt to be treated for each condition separately. The speaker referred to a severe case of this kind in which, after long symptomatic treatment, the patient was much worse and contemplated suicide. In that case the speaker employed lavage with the happiest results. The digestive disturbance was at the foundation of the difficulty, probably owing to fermentation in the intestinal canal. The cardiac palpitation arose from the same cause, and it was this that prevented sleep. With the relief of the dyspepsia all the symptoms quickly disappeared. In this class of cases, he believed lavage very useful, not only because of the local effect of the water upon the stomach, but the flushing of the stomach with large quantities of warm water provided for a very rapid absorption of this water, and its speedy conveyance to the portal circulation. In some peculiarly obstinate cases it might be well to employ the iodide of potassium, and occasionally colchicum might be useful, but he would not give it in any case where there was irritability of the stomach, and it should be given cautiously. Any kind of treatment which will facilitate digestion will be beneficial in lithæmia,—any one of the recognized digestive agents may prove beneficial.

THE TREATMENT OF ACUTE ARTICULAR RHEUMATISM BY HYPODERMIC INJECTIONS OF CARBOLIC ACID.

As long ago as the year 1875, Professor Senator read a paper before the Berlin Medical Society on the "Treatment of Acute Articular Rheumatism by Hypodermic Injections of a Strong Solution of Carbolic Acid in the Neighborhood of the Affected Joints." He pointed out that marked alleviation of the local, and some amelioration of the general, symptoms quickly ensued, and that without any appreciable ill effects to the patient.

In the *Medical Press and Circular*, June 17, 1891, MR. A. L. GILLESPIE states that he has tried this treatment in about twenty-four cases, and that in all instances the results were quite as satisfactory as the five cases reported in detail in which the hypodermic injection of from 2 to 5 minims of a ten per cent. solution of carbolic acid relieved the pain almost entirely within a few hours. In all these cases the salicylates had proved inefficacious.

Having regard to the speedy relief afforded in the first four cases, this procedure seems to merit some attention, for though it might appear somewhat heroic to inject into or close to acutely-inflamed joints a strong solution of carbolic acid, yet the relief afforded was so great and welcome that the patients often begged for a repetition of the injection when another joint became painful. The short time that elapses between the injection and the cessation of pain, only half a minute in one case, the rapid return of freedom of movement, and the ease and ability to sleep thereby afforded, warrant our using it in many cases. It is of especial value in cases of gonorrhœal rheumatism, in which no good has arisen from the use of salicylates, but does not seem to act so well when many of the joints are affected.

Although the author has injected the solution directly into the distended synovial cavity of an inflamed joint without untoward results, it is safer and as efficacious to pass the point of the needle of the syringe through the skin obliquely, and, judging where the synovial membrane is, to inject the fluid as close outside the sac as possible. Injected into the sac itself a ten per cent. solution of carbolic acid precipitates the albumen present in the serous contents.

The rationale of the rapid disappearance of all the symptoms is, first, that it is due to the powerful local anæsthetic action of the acid; secondly, to some slight specific action against the rheumatic poison exerted by it. While with regard to the dose one might give, a grain of the pure acid in a child to 2 grains to 2½ grains in an adult would not be excessive.

CORROSIVE SUBLIMATE AS A DISINFECTANT.

Experiments published by DR. A. C. ABBOTT, made in the pathological laboratory of the Johns Hopkins Hospital (*American Journal of the Medical Sciences*, July, 1891) have a very practical bearing upon the value of corrosive sublimate as a germicide, and the results of these experiments lessen the high estimation in which this agent has been held by most investigators.

Dr. Abbott selected the staphylococcus pyogenes aureus for a series of experiments as to germicide power in consequence of the importance of this subject to the surgeon.

The tests hitherto made upon corrosive sublimate as a disinfectant have agreed in giving to it the first place in the list of these agents.

One method commonly employed in testing the value of any chemical substance as a disinfectant is to expose organisms dried upon bits of silk thread to its action for different lengths of time, and then, after removing and carefully washing the threads in water and alcohol, to place them in nutrient media at a favorable temperature and notice if any growth results from them. If no growth appears, the disinfection was presumably successful. Another common method is to mix fluid cultures of organisms with the disinfectant, and, after different intervals of time, a portion is taken from the mixture and placed in nutrient media just as in the other method.

Now, in both of these methods it is easy to see that, unless special precautions are taken, a minute portion of sublimate may be carried along with the thread or drop into the medium which is to determine whether or not the organisms on the thread or in the drop still possess the power of growth. For organisms in their normal condition—that is, those which have never been exposed to the action of a disinfectant—the amount necessary to restrain growth, for certain disinfecting agents, is very small indeed; and for those organisms which have previously been exposed for a time to such agents, Geppert shows, it is very much less.

In the case of the organism we are considering, Dr. Abbott finds the amount of sublimate necessary to prevent the growth of perfectly normal staphylococci to be 1 part of sublimate in 75,000 parts of the ordinary peptone bouillon, or 200,000 parts of bouillon without peptones. So that, if organisms which have been once exposed to stronger solutions of this salt (1 to 1000) require less than these amounts to inhibit their growth, it is plain that special precautions must be taken to prevent transportation of this minute trace into the nutrient medium which is to demonstrate whether or not the organisms are capable of development.

The author gives in detail a series of experiments, and draws the following conclusions:

That, under the most favorable conditions, a given amount of sublimate has the property of rendering inert only a certain number of individual organisms,—that is to say, the process is a definite chemical one taking place between the protoplasm of the individual bacteria and the sublimate in the solution.

The disinfecting activity of the sublimate against organisms is profoundly influenced by the proportion of albuminous material contained in the medium in which the bacteria are present. It was found that the relation between the golden pyogenic staphylococci and sublimate is not a constant one, organisms from different sources and of different ages behaving differently when exposed to the same amount of the disinfectant for the same length of time.

Many of the results of previous experimenters, who have assigned to corrosive sublimate more powerful disinfectant properties against the staphylococcus pyogenes aureus in cultures than the observations reported in this paper indicate, are attributable to the neglect of certain precautions now recognized as essential to the proper conduct of such experiments.

At the present stage of our knowledge in this direction it is plain that for use in surgical practice the solutions of corrosive sublimate do not possess all the advantages attributed to them.

In regard to the employment of sublimate solutions upon wound surfaces, it is plain that there exist at least two serious objections,—first, the albumen of the tissues and fluids of the body tends to diminish the strength of, or, indeed, renders entirely inert, the solution employed; and, second, the integrity of the tissues is materially injured by the application of this salt. The first objection cannot be met with certainty, for the surgeon possesses no means by which he can determine the amount of albuminous material with which his solutions are to come in contact, and in any case this large amount of albuminous material is an almost insuperable obstacle to complete disinfection with sublimate. He is, therefore, in a position to say, *a priori*, that his efforts at disinfection of the wound are or are not successful.

During the past two years we have had sufficient evidence to lead us to believe that the normal tissues and fluids of the body possess the power of rendering inert many kinds of organisms which may have gained access to them. This function is, therefore, diminished, or, indeed, may be quite destroyed, by any agent which brings about alterations in the constitution of these tissues. We know that just such changes as those to which we refer are known to follow the application of sublimate solutions. It is plain, then, if we bring about in these tissues a condition of superficial necrosis,—the condition following upon the application of sublimate,—they are much less able to resist the inroads of infectious organisms than they would have been had they been left in their natural condition.

As a disinfectant, in the strict sense of the word, there are, perhaps, few substances which possess the property in a higher degree than does corrosive sublimate, but at the same time there is nothing which is employed for this purpose that requires greater care in its manipulation, in order to obtain its best results, than does this salt. In practice its action is influenced by a number of conditions, which it is difficult, if not quite impossible, to control.

For these reasons we seem hardly justified in continuing to give to it the first place in the list of substances which may be employed practically for the purpose of rendering harmless materials containing the germs of infectious maladies.

SALICYLBROMANILIDE.

This synthetic compound, to which the proprietary name of "antinervine" has been given, is a combination of bromacetanilide and salicylanilide, and is supposed to possess the properties of antifebrin, bromine, and salicylic acid, without their unpleasant effects, and may consequently be supposed to have

antipyretic, antineuralgic, and antinervine properties. It is a white, crystalline powder, having a rather pleasant, slightly acid taste, feebly soluble in cold water, but dissolves freely in hot water, alcohol, and ether.

Dr. C. S. Bradfute, who writes in the *Cincinnati Medical News* for June, 1891, states that the dose is from 3 to 10 grains, and is best given in the form of compressed tablets or in simple powders. Dr. Bradfute suggests that, for the sake of brevity, this compound be termed "salbromalide."

The claim has been advanced that salicylbromanilide is of value in diabetes, but Dr. Bradfute was not able to confirm this statement. It seems, however, that this compound is effective as a reliever of pain and those functional disturbances of the circulatory system which occur at the onset of acute diseases, and although its power of reducing the temperature is undoubted, it should be given carefully in states of hyperpyrexia on account of its action on the heart.

A glance at the physiological action of the three agents comprising salicylbromanilide shows that they are essentially circulatory depressants. Salicylic acid acts directly on the heart-muscle, lessening its electro-contractility, and, when administered in toxic doses, causing the organ to stop in diastole. After a preliminary period of stimulation, it depresses the vaso-motor centres. Antifebrin acts very similarly, though its effect upon the heart and vessels is more powerful, producing a rapid fall in the blood-pressure and a weak and irregular heart. Bromine, in addition to its impression upon the heart and vaso-motor nervous system, lowers the vital activity of the centres in the *medulla oblongata*, and interferes with the function of conscious cerebration in a way not yet clearly understood.

It can thus be seen that a compound made up of these three substances, when given in full physiological doses, would probably exhibit an action upon the system manifested by a profound interference with the motor mechanism of the circulatory apparatus, and that whatever therapeutic value could be attached to it, from a pharmacological standpoint, would depend upon this action.

In a series of experiments conducted in the therapeutic laboratory in the Jefferson Medical College, the writer's observations were confirmatory of the above remarks. He found antinervine a profound depressant of the circulation, and a prompt antipyretic. Three grains ejected into the lymph-sac of a medium-sized frog produced death in one hour without convulsions, the animal becoming languid and indifferent to mild stimulation after a lapse of ten minutes, and passing rapidly into stupor, and finally died in a condition of coma, with the muscular system completely relaxed. The reflexes gradually diminished during the course of the poisoning, and were totally absent eight minutes before the cessation of the circulation.

A similar quantity was injected into a frog so prepared that the movements of the heart could be observed *in situ* and the capillary circulation watched under the microscope. The cardiac cycle was observed to gradually and uniformly become longer, the contractions lessened in vigor, the ventricle contracted more slowly than the auricles, reacting lazily to an electric current, and finally the heart stopped in diastole, spreading out like mush when removed from the body and placed upon a glass plate. The capillaries dilated, slowly and irregularly at first, but fifteen minutes before death relaxed entirely, and the blood-current diminished in rapidity in proportion to the capillary paresis and the cardiac depression, the corpuscles tumbling along against each other and showing a tendency to adhere to the vessel wall. Death occurred in forty-six minutes.

The behavior of the heart in the above experiment indicated the poisonous effect of the drug directly upon the organ, but in order to prove this the heart of a healthy batrachian was taken out of the body and placed in a Kronecker-Bowditch apparatus. Here, removed from the influence of the central nervous system, a solution of antinervine was permitted to flow, by means of a perfusion canula introduced into the ventricle, slowly through the heart, and the results observed were the same as those noted when the heart was *in situ*. A control experiment eliminated any undue influence upon the heart from the damage it sustained in placing it in the apparatus.

Upon the rabbit the drug acts very much the same as upon the cold-blooded animal, and its influence over the respiratory movements, which is more distinct in warm-blooded animals, shows the part played by the salicylic acid in the general result. Respiration became rapid, weak, shallow, and stopped before the heart, the latter becoming slower and more feeble, and finally, a few minutes before the circulation ceased, would make no impression upon the drum of a cardiograph.

Guided by these experiments, the writer concluded that salbromalide was best applicable to those affections characterized by functional disturbances of the circulatory system brought about by reflex impressions or too active stimulation, and acute inflammatory conditions occurring in robust subjects. In the cases that fell in his hands, he found this conclusion correct, and noted favorable results, and in some instances obtained curative effects when other remedies had failed or acted unsatisfactorily.

ANTIPYRIN AS A HÆMOSTATIC.

PROFESSOR G. CESARI, of Modena, gives the results of some experiments on the hæmostatic influence of antipyrin applied locally (*Rassegna di Scienze Mediche*, February, 1891). He says antipyrin applied to an injured blood-vessel or to living tissues, whether in the form of fine powder or watery solution, does not irritate or dry or produce any caustic effect on the tissues or cause pain. It gives rise to local anæmia more or less marked according to the length of time the agent is applied. A fifty to one hundred per cent. watery solution produces no change in the calibre of capillaries; but if made to bathe the veins of the mesentery of a frog or the jugular or femoral vein of a rabbit, more or less perceptible narrowing of these vessels can be observed. When a fifty per cent. watery solution is applied to the frog's mesentery the circulation in the capillaries is first slowed and afterwards arrested; if the experiment is prolonged, the circulation in the larger blood-vessels is gradually stopped. While the small vessels of the mesentery and lung in the frog, and those of the ear and skin in the rabbit, become almost bloodless, after an application of a fifty to one hundred per cent. solution, the larger vessels become dark red in color. Mixed with blood just drawn from the veins of a man or rabbit, antipyrin acts in different ways, according to the concentration of the solution. If that is less than twenty per cent., the blood, if placed in a test-tube, acquires a persistent red color; and, if slight coagulation occurs, this disappears at once on merely shaking the fluid. If the same blood is mixed with thirty to one hundred per cent. solution, the color is less dark; the blood remains liquid at the temperature of the laboratory, but if kept at a temperature of 38° C., it acquires a syrupy consistence and appearance, and the test-tube can be turned upside-down without a drop of blood escaping, though there is no trace of coagulation. Antipyrin does not lower or in any way alter the blood-pressure. To sum up, antipyrin more or less speedily arrests hemorrhage from both large and small blood-vessels when applied in solutions of not less than forty, or, better, fifty per cent. The effect of the application of solutions of the latter degree of concentration is almost equal to that of the finely-powdered drug. Both the solution and the powder should be applied on plugs of cotton wool. Antipyrin, in short, if placed in contact with blood at its normal temperature, thickens and condenses it, and, without causing coagulation, prevents it from escaping from the vessels. It stops secondary hemorrhage, and is altogether, according to Cesari, a most valuable hæmostatic.—*British Medical Journal*, June 20, 1891.

SUCCINATE OF IRON.

Since succinic acid in combination with the ferric radical has recently been introduced by the medical profession, as a remedy for the relief of jaundice, resulting from obstruction of the biliary duct by calculi, and with apparent success, a demand for a preparation combining efficiency and elegance has arisen. The originator of this medicine recommends the use of the hydrated succinate of iron as the preparation by which he has obtained such good results in the treatment of the affection referred to. But the preparation is unsightly and anything but elegant as a pharmaceutical product.

Ferric succinate in a hydrated state or dried appears as a cinnamon-brown, amorphous substance quite insoluble in water. It is readily prepared by adding to a solution in water of an alkaline succinate, a solution of ferric sulphate, as long as a precipitate is obtained. In this instance a basic ferric succinate is produced instead of a neutral succinate, a portion of the succinic acid being liberated and remaining in solution.

In a paper published in the *American Journal of Pharmacy* for June, 1891, DR. W. T. WENZELL states that the reaction takes place between one molecule of ferric sulphate and three molecules of the neutral or normal ammonium succinate, and with the assimilation of two molecules of water.

Hydrated ferric succinate occurs in the form of an amorphous precipitate, containing one molecule of water, of which it is deprived

on drying and converted in the basic salt $Fe_2O(C_4H_4O_4)_2$.

The hydrated salt is insoluble in a cold solution of succinic acid or ammonium succinate, more soluble in boiling solution, from which it separates slowly on cooling; is more soluble in citric acid and very soluble in ammonium citrate, even at ordinary temperatures. A solution of ferric succinate in ammonium citrate is quite permanent and can be mixed with succinic acid and ammonia without decomposition. An excess of ammonia merely deepens the color. The solution evaporated at a temperature not to exceed 130° F. solidifies on cooling and standing for a time in a crystalline mass. By experimental synthesis, working with exact molecular weights, it was found that three molecules of ammonium citrate were required to dissolve one molecule of the precipitated ferric succinate, and from these data the following composition of the double salt of ferric succinate and ammonium citrate has been deduced:

$$Fe_2O(C_4H_4O_4)_2,3(NH_4)_2C_6H_5O_7.$$

And from this molecular formula a working formula for its preparation has been calculated.

Liquor Ferri et Ammonii Succinatis.—Dissolve fifty grains of succinic acid in three fluidounces of water, neutralize nearly with ammonia, and dilute to six fluidounces. Transfer the solution to an eight-ounce bottle, add half a fluidounce of the officinal liquor ferri persulphatis and agitate well. Transfer the mixture to a filter and wash the precipitated ferric succinate thoroughly with distilled water. Next take eighty-nine grains of citric acid, put it into a beaker, and add with stirring a sufficient quantity of ammonia-water, until the acid is dissolved and the solution neutral. Finally, transfer the moist ferric succinate to a porcelain capsule, add the solution of ammonium citrate and dissolve, assisted by a gentle heat. The solution when diluted to measure six fluidounces will contain to a fluidrachm two grains of the ferric succinate or five grains of the double salt.

Attention having been called to the dark color of most samples of ferrous succinate solutions, the suggestion has been made that perhaps the ferrous carbonate employed in the usual method of manufacture of this salt is not entirely free from ferric salt, hence the dark color. In the same number of the *American Journal of Pharmacy*, Mr. F. W. Haussmann writes that in some experiments which he has made to settle this question, a solution was prepared with the employment of precipitate of ferrous carbonate, care being taken to prevent the formation of ferric salt as much as possible. The color of both solutions was identical, and on examination of a recently-prepared solution little or no ferric salt was found, hence it may be inferred that the dark color of the sample was not due to the presence of a ferric salt.

ABSORPTION OF FOOD-STUFFS AFTER EXTIRPATION OF THE PANCREAS.

Some important observations have recently been made in Minkowski's laboratory in Dorpat on the above subjects, and some of them are published in an inaugural dissertation by one of Minkowski's pupils, M. Abelmann ("Ueber die Ausnützung d. Nahrstoffe nach Pancreasextirpation," etc., *Inaug. Diss.*, Dorpat, 1890). The experiments were made on animals—dogs—from which the pancreas was totally removed, either in one or in two operations, or in which the greatest part of the organ was excised. The most important results are the following: 1. In dogs without a pancreas, forty-four per cent. of the products of the digestion of proteids is still absorbed, while in dogs with a small part of their pancreas, about fifty-four per cent. is absorbed. If, however, pig's pancreas be mixed with the proteid food (horseflesh), a still larger amount of proteid is absorbed. 2. Carbohydrates are for the most part absorbed in dogs without a pancreas; still, twenty to forty per cent. of the amylaceous food (bread) is not absorbed. 3. After total extirpation of the pancreas, all the fat of the food appears in the fæces. This seems to be due directly to the want of the pancreas and the absence of the pancreatic juice in the intestine; for, on giving pig's pancreas along with the fats, the latter were absorbed. In this case the fats were given as neutral fats. but the same is true of fats emulsionized artificially before they were administered to the dogs. In the case of natural fatty emulsions, however,—for example, milk,—the case is different, about fifty-three per cent. of the fats being absorbed. 4. In spite of the absence of the pancreas, the fats are decomposed, an observation which confirms the well-known observations of Ogata and Cash, who showed that neutral facts were in small amount split up in the stomach. 5. When a part of the pancreas is left, a part of the fat is absorbed, and relatively more fat is absorbed when small quantities of fat are given than when a large quantity is given. Of milk, eighty per cent. of the fat is absorbed. In a second commu-

nication by Minkowski himself ("Zur Lehre der Fettesorption," *Berlin. Klin. Wochensch.*, No. 15, 1890), it is pointed out that the absorption of fats depends on the form in which they are administered. A natural fatty emulsion like milk, and the emulsion normally produced by pancreatic juice, have certain characters in common, and differ from simple soap emulsions produced by alkaline carbonates. Simple alkaline soap emulsions are at once destroyed by the addition of an acid, while the fatty emulsion of milk, as well as that of the pancreatic juice, resist the action of acids. The importance of the pancreatic juice for the absorption of fats may depend on its power of forming an emulsion of this sort.—*Chicago Medical Recorder*, May, 1891.

ADAPTATION OF DIFFERENT ORGANS TO THE PROLONGED USE OF ATROPINE.

Little is at present generally known concerning the effects of the prolonged use of atropine. The most extensive experiments on this subject were made by Anrep (*Pflüger's Archiv*, Bd. xxi.), who observed that in dogs tolerance of the drug was easily producible, especially on the part of the nervous system and of the heart. He concluded that repeated injections of atropine gradually paralyzed the vagus endings in the heart, and that the motor ganglia were also depressed, so that the heart reacted less and less to the drug; finally, the heart became weakened, and was no longer able to accomplish the same number of beats as in the normal state. Dr. Luigi Sabbatino (*Lo Sperimentale*, May 15, 1891) has brought fresh evidence to bear on this subject, and has come to the conclusion that some of Anrep's results are only partially true. He finds (1) that the vagus adapts itself to the action of atropine, so that small doses, which will at first paralyze it completely, will, after a few repetitions, fail to produce paralysis; (2) that the adaptation of the heart to the drug is not due to depression of the motor ganglia, for, in his experiments, the heart-beats never slowed after the injections, but, on the contrary, were always quickened. His experiments were more extensive than those of Anrep, and were performed on frogs, rabbits, and dogs. The observations on frogs were made by immersing the animals for several days in water containing .08 per mille of atropine sulphate. Every four or five days a frog was removed, and the excitability of its vagus tested. At first no arrest of the heart could be produced on stimulation, but after several days' immersion this was again possible; the sinus and auricles could be arrested, while the ventricular pulse became slowed. He therefore concluded that in frogs the paralyzing action of atropine on the vagus diminishes with prolonged use. The experiments on rabbits (animals little susceptible to atropine) were made by giving daily and increasing injections of the drug. The animals remained perfectly well, and, on testing the irritability of their vagi, this was found to be almost normal after repeated injections, whereas single doses completely paralyzed the nerve. In rabbits, then, after prolonged use, atropine loses much of its paralyzing effect on the controlling mechanism of the heart. In dogs, experimenting in the same way, he found that, even after a considerable time, large doses would completely paralyze the vagus; but that small doses, sufficient under ordinary circumstances to paralyze it completely, would produce only a slight diminution of its irritability, so that stimulation of the nerve then produced not arrest, but only slowing of the heart. In these animals, therefore, the power of adaptation is not so complete as in frogs and rabbits, but is still marked. As regards the action of the heart, Dr. Sabbatino found that the first effect of an injection was to increase the frequency of its pulsations rapidly up to a maximum; this maximum was, however, of short duration, not usually lasting more than ten minutes, after which a diminution commenced, at first rapid, then more gradual, so that even twenty-four hours after injection the pulse-rate did not quite return to normal. Thus the drug produces a great frequency of the pulse, of which part is only temporary, and the remainder of long duration. Four hypotheses may be advanced to explain the above; stated briefly, they are as follows: 1. It may depend on the mode of elimination, which may be at first rapid, and then slower (this would not explain, however, the fact that, with repeated injections, the acceleration produced by each dose is less marked and less prolonged). 2. The drug may not only paralyze the inhibitory but it may excite the accelerator mechanism; and this view receives some support from the fact that the injections are followed by evident excitement of the nervous centres, which may also excite at first the accelerator centre in the medulla. 3. The third hypothesis is that of Anrep, who imagined that a depression of the intracardiac ganglia coming on after that of the inhibitory

apparatus might account for the subsequent gradual slowing. 4. The last and most probable hypothesis is that the great initial frequency is due to the transitory increase of blood-pressure produced by atropine. The inhibitory apparatus being paralyzed, the increased pressure would act as a stimulus to the heart, at first strong, but gradually becoming feebler with the fall of pressure; the accelerator centres may also be at the same time stimulated. From the diminishing effect of repeated doses, the author thinks that with use atropine loses this excitant action on the accelerator mechanism. As regards the action on the nervous centres, he agrees with Albertoni, who concluded (*Arch. f. Exp. Path. u. Pharm.*, 1882) that atropine at first increases the excitability of the brain, but that with repeated doses the excitability is neither so great nor does it diminish the possibility of producing epileptiform convulsions by stimulation of the cortex. The motor apparatus of the iris appears to be usually completely paralyzed, although in one rabbit, after several injections, exposure to a strong light would produce constriction of the pupil. This observation would correspond to the slight susceptibility of these animals to atropine. Some interesting observations were made on the prolonged action of the drug on the secretion of saliva and of sweat. The first few doses would completely mask the effect of pilocarpine subsequently given, but finally a tolerance seemed to be set up, so that pilocarpine would then produce a free flow of saliva and sweat. The tolerance of these mechanisms is, therefore, considerable, but is not prolonged much after discontinuance of the drug, for a further injection after an interval is found to be as powerful as ever. Finally, observations on dogs show that the intestinal nerves also exhibit to some extent a tolerance for atropine. At first the drug produced much intestinal irritation and diarrhœa, but this usually passed off after a few days, unless the dose was increased.—*British Medical Journal*, June 20, 1891.

THE GALLATE OF BISMUTH.

In a preliminary communication Drs. Heintz and Liebreich announce, in the *Gazette Médicale de Paris*, June 20, 1891, that they have found in the gallate of bismuth, which they baptize with the name of "dermatol," a topical application, which they recommend as a substitute for iodoform, in that it possesses all the properties of the latter substance, with the great advantage of being inodorous.

The gallate of bismuth occurs in the form of a fine powder, without odor, of a yellowish-saffron color, and of an aspect somewhat similar to iodoform. It is not hydroscopic, and does not decompose when exposed to the air or the light. It is insoluble in ordinary solvents, and consequently is free from toxicity, for when applied to a raw surface, such as that of a wound, it is absolutely incapable of absorption. It is said not to act as an irritant on the surfaces with which it comes in contact. It possesses considerable desiccating power, and to this extent acts as a stimulant. The authors state that their clinical experiments with dermatol, which have already amounted to more than one hundred, show that cicatrization is rapid and the formation of granulations favored, while the secretion of pus is diminished. They have used this salt in the treatment of burns, in eczema, in ulcerations, in ocular affections with painful morbid secretions, in affections of the nose and ears, and especially in otorrhœa; finally, they add that the gallate of bismuth may be administered internally in the dose of 30 grains, without producing the slightest symptom of poisoning, and it may thus be substituted for the subnitrate of bismuth in affections where this preparation is indicated.

INFANTILE PLEURISIES AND THEIR TREATMENT.

Dr. A. F. Plicque (*Progrès Médical*, January 31, 1891) summarizes his observations on the subject of infantile pleurisies and their treatment in the wards of Dr. J. Simon in the Hôpital des Enfants Malades, Paris. Pleurisy in infants is almost always secondary to some inflammatory or zymotic disease. Effusions have a marked tendency to become purulent, and in the case of children under four years pus is the rule rather than the exception. The collections of fluid are very prone to become encysted, and hence may be met with at any part of the chest, and not always at the most dependent portion. They are liable to burst internally, and the general prognosis is good, provided that the pus has free exit, either through the chest wall or through the lung. Such forms of effusion are, therefore, very different from the similar conditions in the adult. Owing to the almost constant complication with some other morbid condition in the chest, the diagnosis is frequently

difficult. Progressive dulness, with absence of respiratory sounds over the same area, are the only trustworthy signs. The gradual progress of the altered physical signs must be closely watched for a time before a certain diagnosis can be made. In the early treatment of infantile pleurisy the use of calomel and digitalis is recommended, and a protest recorded against the abolition of the poultice, which is believed to aid absorption and to prevent the progress of the disease to the purulent stage. Tapping should always be done at first with the aspirator, an antiseptic solution being used to wash out the cavity. Fluid should always be withdrawn slowly and gently, and the introduction of the antiseptic solution—lukewarm boracic solution is the best for the purpose—performed with equal care and deliberation. No fear need be felt in using large quantities of fluid to flush out the pleura ; as much as five or six litres have been employed. If tapping fails to prevent the re-formation of purulent fluid, an incision must be made and irrigation carried out in the same way. The best point for incision in case of a general effusion is somewhat farther forward than in the case of an adult, the anterior axillary line being selected instead of the posterior line. In case of encysted fluid the incision must be directly over the point of localization. Frequent and cautious washing out of the cavity is advised in after-treatment. Estländer's operation is rarely necessary in the case of infants.—*Chicago Medical Recorder*, May, 1891.

CELASTRINE, THE ACTIVE PRINCIPLE OF CELASTRUS EDULIS.

It is stated in the *Revue Internationale de Bibliographie* for May 25, 1891, that PROFESSOR MOSSO has succeeded in extracting an alkaloid from the celastrus edulis, which he terms "celastrine." Its general action on cold-blooded animals is excitation of the nervous system in the preliminary stage of poisoning with a small dose, with depression in the latter stage with a large dose. On warm-blooded animals, Professor Mosso states that he has constantly found but slight variations in the blood-pressure or the respiration ; it produces stimulation of the cerebrum, and slight excitation of the spinal cord and vagus, and elevation of body temperature. It is a marked cerebral stimulant, and the author believes that its action is closely comparable with that of cocaine. Celastrine is the better stimulant of the two, as it produces no secondary depression and no functional disturbance.

THE DIURETIC PROPERTIES OF THEOBROMINE AND DIURETIN.

We have in previous issues of the GAZETTE detailed the results obtained by a number of investigators as to the diuretic action of theobromine. A number of additional data have recently been published, and have been analyzed in the *Medical Chronicle* for June, 1891, by DR. D. J. LEECH.

Schroeder first showed that caffeine produces its diuretic effect by stimulating the epithelial cells of the kidney, but that this influence is decreased owing to the contraction of the renal vessels which caffeine causes by its stimulating action on the vaso-motor centre. He showed, too, that theobromine, which only differs chemically from caffeine by containing one equivalent less of methyl, and which has less effect on the cerebral nervous system than caffeine, acts as a powerful diuretic in rabbits. He suggested, therefore, that it might be employed as a diuretic in man. Its high price prevented for some time this suggestion being acted upon, but in recent times it has fallen to one-tenth the price it formerly commanded, and Dr. Gram has made a series of observations on its use as a diuretic. He got some good results, but its action was unreliable, because absorption does not always take place ; at times, too, it caused slight sickness. After trying several combinations of theobromine, he met with a compound of theobromine and sodium salicylate, which is very soluble in water, and is now sold under the name of diuretin. This salt is white, and soluble with heat in less than half its weight in water ; and no precipitation takes place on cooling. It contains fifty per cent. of theobromine, and does not cause sickness.

Gram gives records of eight cases in which theobromine sodium salicylate was given. Five were cases of cardiac disease and three of renal disease. In a case of mitral insufficiency, with dropsy and albuminuria, 30 to 60 grains of theobromine caused very marked diuresis without increasing the amount of urea. Caffeine, given with paraldehyde, had subsequently similar but less marked effect in increasing the quantity of urine ; digitalis was without influence.

In another cardiac case in which digitalis

failed, theobromine had, on two occasions, a very marked diuretic influence. Here, however, pericarditis supervened during diuresis following on the administration of theobromine. The quantity of urea passed was not altered.

In a third instance, in which strophanthus was of little service, theobromine sodium salicylate markedly increased the amount of urine passed, and this increase was accompanied by a considerable augmentation in the amount of the urea excreted.

In a fourth case, in which cardiac degeneration with mitral stenosis and insufficiency and albuminuria were present, the diuretic effect of diuretin was on three occasions very considerable, and a calcium salt of theobromine likewise increased the amount of urine. Here digitalis also produced some influence, but strophanthus, caffeine, and calomel proved useless.

In this case it is noteworthy that under the theobromine salt the urea decreased and the albumen was increased in amount.

In the fifth case the theobromine sodium salicylate salt, in doses of 180 grains daily, had a powerful influence in increasing both the water and urea; digitalis proved quite useless.

In three out of the five cases the influence of the theobromine salt was noticed on the same day, and on the day following the administration of the drug.

Of the three cases of nephritis reported, one was treated with theobromine, in doses of 45 to 60 grains daily; the diuresis only showed itself on the fourth day. The total amount of urea decreased when diuresis set in, while the amount of albumen increased somewhat.

In a second case the theobromine sodium salicylate had on three occasions a powerful diuretic influence; in the third,—a case of tuberculosis with nephritis,—the theobromine sodium salicylate not only increased the quantity of water, but the amount of urea also.

There can be no doubt that in Dr. Gram's hands the theobromine sodium salicylate proved a powerful diuretic. He does not, however, record cases (if any), in which he tried it without success.

He found no influence on the heart or circulation produced by the drug, and in the doses in which he gave it—45 to 90 grains—it caused no unpleasant after-effects, and did not affect the central nervous system.

Dr. Hoffmann says that, according to Vulpius, the preparations supplied under the name diuretin do not agree either in the amount of theobromine or in their solubility. He used the diuretin sold by Knoll & Co., which is a combination, he says, of theobromine sodium with salicylate of soda. It has a bitterish taste, and is best given in a five per cent. solution, with a little syrup and peppermint or fennel-water. From such a solution a little theobromine in a few days is precipitated. As diuretin is decomposed in the air, it is not well to order it in powder.

Diuretin is manifestly absorbed after it is taken, for the color-test shows its presence in the urine. In the fæces no trace of it can be found.

Hoffmann administered the diuretin in seventeen cases, whereof five suffered from pleurisy with effusion, one from peritonitis and pleurisy, two from leukæmia and dilatation of the heart, one from cirrhosis, one from acute nephritis, one from amyloid kidney, two from chronic nephritis, and four from organic heart-disease.

In all the cases of simple pleurisy the diuretin caused, on the day following administration, an increase in the secretion of water, in some cases small, but in some cases very large, the amount of urine being doubled or trebled. When the inflammatory condition was subsiding, the increased urine flow seemed to have a favorable effect in decreasing the exudation. Slight diarrhœa occasionally occurred. No other after-effects were noticed, although 75 to 105 grains were given daily.

In the patient where tubercular peritonitis and pleurisy coexisted, no diuretic effect followed the use of the drug, and it likewise failed in the case of liver cirrhosis. On the other hand, in the two cases of chronic nephritis, and in a case of acute nephritis, the diuretic effects seemed marked, but no effect was produced in a case of amyloid kidney complicating phthisis. The most marked instances of the diuretic action of the theobromine compound was seen in cardiac dropsy. In these cases, diuretin was, for the most part, only given when digitalis had failed, and Hoffmann records four carefully-observed cases of its marked diuretic influence in cases of cardiac disease. In twenty-four hours a slight increase of the urine was often noticed, which gradually reached its maximum in two to six days, the quantity falling when the dropsy decreased or the medicine was stopped. In some of the cases recorded the drug produced a marked increase several times, which quickly ceased when it was stopped. Sometimes several days elapsed

before any effect was evident, probably from a slower absorption of the drug. A cumulative action was not observed, and the diuretic action never lasted more than a day or two after the cessation of the drug. The urea excretion increased somewhat under its action. The pulse was usually slightly slowed, often unaltered; in the majority of cases, it became somewhat stronger and less irregular. The appetite improved, though slight but painless diarrhœa came on not unfrequently. An improvement in general health usually followed the strengthening of the circulation, and patients slept better. Excitement was never produced by it.

Hoffmann comes to the following general conclusions with regard to diuretin:

1. It is of marked service in general dropsy. It is of less use in accumulations of fluid due to inflammations of serous membranes. Where there is congestion of the portal circulation it is of no use.

2. Its diuretic action depends upon its influence on the kidney epithelium, but also exercises a favorable influence on the circulatory apparatus. In daily quantities of 75 grains it does not produce any unpleasant effects; on the contrary, it improves the general condition.

3. It may prove of service where digitalis and caffeine have failed, and may be given in combination with heart tonics.

Koritschoner records the effects of the use of diuretin in the words of Professor von Schrotter. Here it was given in thirty-eight cases of severe dropsy,—renal, cardiac, and portal,—and in three cases of acute rheumatism, besides being tried on several healthy men. The treatment was commenced with 60 grains daily, and the dose was increased by 15 grains daily. In sixty per cent. 75 grains sufficed to produce a favorable effect; in thirty per cent. 90 grains were required; in ten per cent. the dose had to be raised to 150 grains. No unpleasant effects were observed after taking it. In twenty-three cases the influence of diuretin surpassed that of other diuretics, and in eight of these it was extremely great. In ten it had a moderate effect, but even here it was as good or better than other diuretics. In four cases the diuresis was only slight, but in all these the patients died within four days of admission to hospital. Only in one case was the drug without any effect. It was found most useful in cardiac dropsy, and less useful in the dropsy dependent on nephritis than in that dependent on the portal circulation. Nevertheless, it was more useful than other diuretics in Bright's disease. It could not be shown to have any influence on the action of the heart.

Konindjy-Pomerantz has observed the effects of diuretin given under the directions of Dujardin-Beaumetz, in the Cochin Hospital. It is described as a compound of theobromine and sodium and of salicylate of sodium.

To prepare it, a molecule of theobromine (180) is dissolved with a molecule of soda hydrate (40), and to the solution a molecule of hydrate of soda (160) is added. When evaporated to dryness, 362 parts of the double compound are obtained, in which there ought to be 49.7 per cent. of theobromine, but some specimens of diuretin do not contain above thirty to thirty-eight per cent. of theobromine. The conclusions arrived at are much the same as those previously described. It is pointed out, however, that diuretin cannot be given hypodermically.

Dr. Konindjy-Pomerantz looks upon it as a stronger diuretic than caffeine, when 45 to 75 grains are given daily in 15-grain doses every two or three hours. Although diuretin acts on the renal epithelium, and it does not influence the contractions of the heart, it should be used with caution in patients suffering from organic disease of the heart.

The increased urine flow produced by diuretin is said to last three or four times as long as that produced by caffeine, and the patient does not get habituated to its use.

It should be given in milk or chocolate before eating. When the kidneys are affected, diuretin has no influence.

THE ACTION OF NICOTINE ON THE CIRCULATION.

DRS. WERTHEIMER and COLAS have recently completed an elaborate experimental investigation as to the action of nicotine on the heart and circulation (*Revue Internationale de Bibliographie*, May 25, 1891). They find—

First.—As regards the heart, destruction of accelerator nerves, or of the extrinsic accelerator centres, does not prevent the production of increased frequency in the cardiac action, as a result of the two phases of poisoning with nicotine. As a consequence, the action of the poison is exercised exclusively on the intrinsic ganglia.

Second.—The increased excitability of the cardiac muscle in poisoning by nicotine is, in the author's opinion, evidenced by the fact that excitation of the apex leads to the production of a series of pulsations and not a single beat only.

Third.—As regards the action of nicotine on the vascular system, when a simultaneous registry is made of the general blood-pressure and of the volume of one of the abdominal organs, the spleen, or the kidneys, it is found that the former diminishes at the moment where the latter increases. This state of affairs is followed by a second phase, during which the fall of pressure coincides with an increase in the volume of the organ. These two successive modifications of pressure are independent; the first being dependent on the constriction of the small splanchnic vessels, the second on their relaxation. While the blood-pressure is increasing, the mucous membrane of the lips and of the tongue becomes the seat of an intense congestion from the excitation of the vaso-dilators of that region. After the complete destruction of the spinal cord, the injection of nicotine still determines an increase of blood-pressure, which may amount to as much as twelve centimetres. Further, if the nerves of one side of the tongue or the lips are divided, the congestion of these parts produced by nicotine is quite as marked as in the normal side. The authors believe that this experiment tends to demonstrate the existence of purely peripheral vaso-dilator and vaso-constrictive ganglia.

Reviews.

A Practical Treatise on Diseases of the Skin. By Henry G. Piffard, A.M., M.D., Clinical Professor of Dermatology, University of the City of New York, etc. 4to. With fifty full-page original plates and thirty-three illustrations in the text.
New York: D. Appleton & Co., 1891.

This work, evidently an outburst of the photographic enthusiasm which has been seething in the mind of our esteemed dermatological *confrère* for several years past, is, in so far as uncolored photographic processes are adequate to portray the various diseases of the skin, a meritorious one, exhibiting the same energy and painstaking care which characterize all of the author's writings. An examination of the plates and other illustrations show that in those diseases in which there is any peculiarity in the arrangement or configuration, or if the lesions are of a gross nature, the portrayal is of value and of interest. This is shown, for instance, in such plates as No. IV., Eczema of the Sole; No. VI., Psoriasis; No. XIV., Syphilitic Dactylitis; No. XXII., Fibroma; Nos. XXIV. and XXV., Elephantiasis; Nos. XXX. and XXXI., Vitiligo; No. XXXIX., Dermatitis Herpetiformis; No. XLIV., Zoster; No. XLVIII., Ichthyosis; and No. XLIX., Alopecia Areata, which carry with them a clear conception of these diseases. On the other hand, those diseases which are to be recognized by their color, or in which the lesions are for the most part small and without any special arrangement, cannot be so satisfactorily portrayed. This is made evident in such plates as Nos. IX. and X., Papular Syphilide; No. XXVII., Acne Indurata; No. XXXII., Scabies; and Nos. XXXVII. and XXXVIII., Chromophytosis. The three plates—Nos. XXVIII., XXIX., and XLI.—showing photo-micrographs of sections of Lupus, Sebaceous Gland, and Eczema Seborrhœicum, respectively, are admirable. The two plates—Nos. XXVI. and L.—depicting Seborrhœa Kerativa (Keratosis Follicularis) and Psorospermosis, two exceedingly rare, but possibly allied, diseases, are of much interest to the specialist. Of the illustrations in the text demanding special commendation are Figs. 1, 5, and 6, Tertiary and Hereditary Syphilis; Fig. 15, Keloid; Fig. 16, Vitiligo; Fig. 23, Trichophytosis; Fig. 26, Zoster; Figs. 28, 29, and 30, Alopecia Areata. The accompanying text is clear, concise, and descriptive, and contains, upon the whole, the essence of the therapy of the subject. The publishers' part of this work leaves nothing to be desired.

Origin, Purpose, and Destiny of Man; or, Philosophy of the Three Ethers. By William Thornton, M.D.
Boston: Published by the author, 1891.

Direct thinking leads to direct writing. Had Dr. Thornton felt impressed with the ownership of a great idea, the reader of the "Origin, Purpose, and Destiny of Man" would have found the great idea in his pages, whereas a most careful reading only leads us up to the conclusion that its unfolding must await a future volume. But years ago the same writer, in "Rationalism in Medicine," claimed to possess a great discovery, and to write his book only for its revelation, and at the end the reader was referred to a future work. Is there a great idea, one naturally asks, or is Dr. Thornton, being in possession

of some specific which, in his hands, has done wonders, only writing to conceal his thoughts, only writing because great and noble souls, who have discovered in the field of medicine in past ages, have been compelled by a generous emotion to give their knowledge to all, and he who would pass as a scientific member of a great and useful body of men must make some show of publicity, and must flaunt something in the air, albeit be not his flag, but only his bandanna?

Dr. Thornton believes in the "three ethers" of man. Not the seven stages, with which Shakespeare has made us familiar, but three ethers. Of which, strange to say, "sulphuric" is not one. If the reader wants to be thoroughly confused and convinced that either he is a fool or the author is, we recommend this book. Listen to this: "According to my philosophy the Creator is not to be found in the universe in any morphological form. He has only a subjective existence,—that is, he dwells in the mind in a subjective sense, and although omnipresent is never objectively manifested." This should be clear, and from it we gather that the Creator—Dr. Thornton's Creator—can be avoided, though the Psalmist thought not, by going into anything with a "morphological form," since the "Creator is not to be found" there. "Morphological" is probably used by the author in a new and original sense, and he probably derives it from the two well-known words "morphia" and "logic."

But to the grand discovery. Nature having formed man out of a few elements, nothing is of use to him when sick but those same elements. Oxygen, hydrogen, nitrogen, carbon, sulphur, phosphorus, and a few more make up the well-known list. Dr. Thornton did not discover this, but he did discover that we are all hopelessly wrong, therefore, in administering any or all of the long but incomplete list of drugs which he furnishes and holds up to opprobrium, beginning with dulcamara, bismuth, kamala, coriandrum, opium, aloes, and so on through two pages of double columns, "none of which are ever found in the body in a healthy state." This is Dr. Thornton's discovery, and it is a double one,—first, that these substances, mostly vegetable, do not contain any oxygen, carbon, hydrogen, etc.; and, second, that these drugs are elementary bodies, and must be excluded, as gold and silver and other inhuman elements are. But the author would by no means fill his suffering patients with crude, even if proper, elements. He sees that pumping the body full of oxygen, hydrogen, carbon, sulphur, and phosphorus would fail to cure even the most simple diseases. He would have us give them in a proper natural combination as a chemical food,—not Parrish's, but his own, and of its form and method of concoction he fails by an oversight to tell us.

The knowledge of the day is but imperfect. We are willing to agree in a measure with him when he writes, "It cannot be said that an absolute analysis of urine has ever been made in a single instance;" but he gives us no way by which we may make the "absolute" analysis, and owns that "a relative analysis answers many practical purposes." He rails, he tells us, against wrong methods to stimulate medical men to investigate the right method. But what is the right method, or what, we ask the careful reader, is Dr. Thornton's method; for he tells it not? "It does not seem impossible," he says, "to infuse the elements of youth into the old man." He does not claim to be able to do this, but his words are suggestive of elixirs of life and fountains of eternal youth. "If phosphorus could be introduced into the nerve-centres unoxidized, a train of diseases would be under perfect control." This may be so, or may not, but it strikes us as the reasoning of the merest pseudo-scientist. If the phosphorus could be introduced unoxidized, and if the nerve-cell, which may be in need of it, or may not, were able then at once to assimilate it, and if it, and it alone, were proved to be all that the nerve-cell needed to restore it to perfect health and activity, then, and only then, would Dr. Thornton's remark be true, even if not original. Again: "Aid nature by using that which she first selected. By this process I was led to the means of removing some of the most extreme cases of congestion. Now, it is well known that suppuration is one of the consequences of congestion and high temperature, manifested by chills and fever." Again: "I have discovered that diabetes mellitus is produced by the absence of that ferment required for the splitting up of sugar into its chemical derivatives." This modest claim to the discovery of one or more of the theories concerning diabetes can scarcely be expected to appeal very strongly to the profession, at least until Dr. Thornton gives us the date of his discovery and some particulars concerning the nature of the "ferment" in question.

We have said that the author fails to tell us his system. We should have said that he fails to make it of practical value to us; he

does give us the system, for we read, page 71: "A complete system of medicine can be founded only on the following principles. . . . Nothing is to be introduced into the body in a diseased state, but that which is formulated from the elements found in it in a healthy state." After this the subject is dropped, and we have a chapter on the "Germ Theory," as he views it. It is quite needless to say that he views it quite wrongly if the scientific world is right, and as his remarks involve contradictions and absurdities, we prefer to side with the scientific world, so that when we reach the chapter on "Immortality," we are scarcely in a frame of mind to value very highly his crude and ponderous statements of the misunderstood and distorted speculations of others. He professes to find God in the universe, and explains Moses, when he writes, "In his own image, male and female, created he them," in a way which would require Moses to understand. Explanations of Moses, like refutations of Moses, are deadly things at present to handle. "He could not mean that God was the image of both male and female at the same time." This the author cannot believe. But he does believe that "births without limbs, fused kidneys, two heads at a birth, four legs and arms, and innumerable morphological peculiarities can all be accounted for by the heterogeneous play of the potentialities;" and with this play we leave him, trusting that the same explanation will account for the peculiarities of the mental birth of the "Origin, Purpose, and Destiny of Man." E. W. W.

MEDICAL SYMBOLISM, IN CONNECTION WITH HISTORICAL STUDIES IN THE ARTS OF HEALING AND HYGIENE. By Thomas S. Sozinskey, M.D., Ph.D., etc. Illustrated.

Philadelphia and London: F. A. Davis, 1891.

Why the serpent and the goat should be animals symbolical in some way of the medical profession is a mystery. The serpent may have prophetically prefigured the bacillus, while the goat might have represented a miasm; or, again, the goat may have been example to the public that it should swallow what we give it without gainsaying. But, then, how much more applicable to the patent nostrum vendor than to the noble and elevated profession we represent! We wonder how many practitioners, trained in the days of the "two years' course," know who Æsculapius was. For such, if such there be, who never heard of him, to whom Anubis and Hermes, "Thoth," and "Chonsu-Nefar-Hotep" are names that conjure up no vast vision of past ages, to whom the pine-cone recalls only sanitas and fir-wood, and the tree of life was but a growth in the biblical garden of Eden, this book was written. In it they will find the germs of many things, the full growth and flower of which they must seek in larger volumes and far deeper study, but if it leads them to this it will have done its work, and its lamented author will have by no means lived and studied and written in vain. E. W. W.

THE PRESCRIPTION, THERAPEUTICALLY, PHARMACEUTICALLY, GRAMMATICALLY, AND HISTORICALLY CONSIDERED. By Otto A. Wall, M.D., Ph.D., etc. Second and revised edition.

St. Louis, Mo.; Aug. Gast Bank-Note and Lithograph Company, 1890.

Did all who essay to write prescriptions master thoroughly the contents of this book before beginning their work, what a marvellous change would be wrought in the druggist's prescription file. How to it would flock as to a sacred shrine all lovers of the beautiful in art, in literature, and in science! The children would study there the art of chirography; the literary man would hasten there to learn a correct and elegant style. The poor boy, if such there be, debarred from school and instruction, would there become finished in Latin and English at the same time. Prescriptions would be sought, not so much for what they could do as for what they could teach, and both pharmacist and doctor would alike rise in the estimation of the educated world.

And while much of the curious lore collected by the author will perchance fail to make our pills purge more painlessly or be more active, yet, since no knowledge ever comes amiss, the professional reader will be interested on every page. He will carry away with him when he closes the book the mysterious history of the sign of the scruple (℈), and will henceforth, in his mind, associate it with the vague speculations of Ignatius Donnelly, the ancient axe-head found in Rome, with the unknown language inscribed upon it, the Aztec hieroglyphics, and all the glamour that the unknown and the ancient cast upon all they touch. We are sorry to find the author describing the "scruple" sign as obsolete, or nearly so, and as "rarely used in prescriptions at present." We think this is a mistake, though probably the metric system has made more progress in the pushing West than in the slow-going East.

How many prescribers are aware that a prescription should consist of the four parts,—base, auxiliary, corrective, vehicle,—or that some would add a fifth,—the "adjuvant." To how many physicians does the word "vehicle" conjure up any idea other than that of a conveyance, by means of which they can reach their patients, *tuto cito et jucunde* for themselves. The most useful part of the book probably is that on the combination of remedies and how "to obtain a new remedy not afforded by any single substance." In regard to the ascertaining of the proper dose of a remedy, the author gives Young's, Cowling's, and Clark's rules, the last being based upon weight, and, if a safe and carefully-studied rule, most applicable to infants. But the reader will find that every point connected with the business of prescribing has been carefully covered by the author, and the youthful graduate, after mastering the book, can face a frowning world undismayed and win golden opinions early in his career from the apothecary and his clerk.

E. W. W.

A Treatise on Massage, Theoretical and Practical: its History, Mode of Application, and Effects, Indications, and Contraindications, with Results in over Fifteen Hundred Cases. By Douglas Graham, M.D., Fellow of Massachusetts Medical Society, etc. Second edition, revised and enlarged.

New York: J. H. Vail & Co., 1890.

This is a very thorough work on massage. It gives us as usual all the history of the process from Homer to Weir Mitchell, all that Plato said about it, and Pliny and Hippocrates. How the Romans and Greeks and Scythians practised it. The author, rather curiously says, "It is astonishing how many there are who have thought that massage was indigenous to their own or some other country."

The author has given us a very thorough and scientific description of the method of applying massage. This, after all, is the test of value in works of the kind. Are they practical? No amount of extracts from Homer or from Cicero would enable the reader to practise the art successfully? Will a perusal of this book suffice? To a certain extent it will. The object-lesson is still invaluable, and the art can be best acquired from a proficient instructor; but, so far as words can tell us, the reader of Dr. Graham's book will, with some experimental practice, become efficient.

The effects—physiological—of this procedure are next carefully studied, and there follows the application of the process to special and particular cases. Here the author introduces his experience of over fifteen hundred cases, with good effect. His chapter on "Massage in Neurasthenia and Anæmia of Women," while it follows closely the teaching of Playfair and Mitchell, possesses much originality, and contains new and valuable ideas. The chapters on "Massage and its Effects on the Internal Organs" are exceedingly valuable, because to a large extent clinical. "Massage in Affections of the Central Nervous System" is a study of its effects in that large class of cases in which diagnosis is most at fault and therapeutics have already failed. Necessarily, the author has to devote considerable space to the misapplication of massage, and its dangers when injudiciously used or overused. "Massage in Writer's Cramp," "Neuralgia and Paralysis," "Muscular Rheumatism," "Scoliosis," "Sprains and Synovitis," "Joint-Affections," and "Rheumatic Gout" are the titles of succeeding chapters, and their pages are full of suggestion, advice in unusual emergencies of practice, and cases in detail.

It is a book which will well repay its diligent reader, and as such can be heartily recommended to those seeking light in practical massage.

E. W. W.

The Pocket Materia Medica and Therapeutics. A Résumé of the Action and Doses of all Officinal and Non-Officinal Drugs now in Common Use. By C. Henri Leonard, A.M., M.D., etc. Illustrated.

Detroit, Mich.: Medical Journal Company, 1891.

This book fills a waiting niche, and will be welcomed by all who have tried to keep up with the recent flood of new remedies and the resuscitation of old ones, which marks the present medical era. Arranged alphabetically, we find under each drug a compact yet complete synopsis of all the facts concerning it which are generally needed, with its preparations and dose. The value of this book over many others lies in its completeness and its fulness. Many works fail in not including all known remedies. Of course, we will not venture to assert that the author has omitted none, but from the multiplicity of rare names and from a somewhat rough but efficient test, we think he errs less than his predecessors. The country practitioner and the pharmacist will both agree in valuing the book.

E. W. W.

Correspondence.

BERLIN.

(From our Special Correspondent.)

Serious Charge against Professors von Bergmann and Hahn—The Carcinoma Cure Craze—An Explanation of the Physiological Action of Tuberculin—Professor Lannelongue's New Treatment of Tuberculosis—Dr. Max Rubner, the Successor of Professor Robert Koch—Discovery of a New Remedy against the Bite of Snakes and Rabies—Blood Inoculations against the Bite of Rabid Wolves—The "Rare Case" in the Panopticum.

Professors Bergmann and Hahn (surgical chiefs of the City Hospital, Friedrichshain), the most renowned of German surgeons, have been charged by Dr. Eugen Leidig, a governmental lawyer, with malpractice, or, more accurately, with making unwarrantable and dangerous experiments on carcinomatous patients. Before entering into details of that charge, which is at present attracting great attention, it will be of interest to learn the history of the case.

A Paris clinician of considerable repute recently created a sensation by reporting before the Academy his experiments regarding carcinoma made in the St. Louis Hospital. The humane French experimenter could boast, not of having cured, but of having artificially produced carcinoma on various hospital patients. Carcinomatous matter was introduced in various portions of the body without the sanction of the patients, and in spite of great pain endured by the patients. The experiments were invariably successful, or, in other words, the patients became carcinomatous. One of the doomed patients died shortly. The Paris Academy protested energetically against experiments of this nature. I think that the President of the Academy would have sustained the reputation of that illustrious institution better if he had called the next policeman, demanding the arrest of the scoundrel. It is revolting to even think that such methods of investigation should ever enter a science the ultimate objects of which are purely of a humane character. It is indicated to construct new and energetic legal restraints to such morbid outgrowths of pathological research.

Soon after the announcement of that French affair, rumors were afloat that the same thing occurred in German hospitals too, and a number of celebrated names were mentioned in that connection. Dr. Eugen Leidig, a governmental lawyer, succeeded in gathering sufficient proof of evidence to charge Professors Bergmann and Hahn with undue experiments in the indicated direction. It is gratifying to know that the German surgeons confined their experiments solely to patients who had already been carcinomatous. The charge specifies and proves that by the experiments of the two professors new carcinomatous foci had been created on previously healthy regions of the body. Professor Hahn is known to have transplanted in a carcinomatous woman three excised carcinomatous nodules to remote portions of the body, and to have thus produced three new carcinomatous foci in previously healthy regions. The particles were covered with healthy skin, and soon began to grow, attaining three to five times their original size. The surrounding tissue showed a distinct carcinomatous character.

Professor Bergmann is known to have repeated this experiment with equally positive results. It is impossible to sanction the principle involved in these experiments, and the best we can say is that such procedures should be punishable if made without the connivance of the patients.

From all appearances the carcinoma craze has succeeded the tuberculosis cure craze. In Cracow, Vienna, and Berlin the cranks are hard at work again to discover the unknown and unknowable. Tuberculosis and carcinoma will continue to remain maladies over which human skill is powerless in spite of all experimentation. Still men of high scientific repute, aside of Hahn and Bergmann, are in Berlin, too, at present engaged to find a cure of cancer. I have learnt that a secret society has been formed, the object of which is to promote the therapeutics of carcinoma.

Professor Adamkiewicz, of Cracow, has gone to Vienna, and demonstrated before the Academy his new method of curing cancer. Adamkiewicz is, in spite of his Polish name, a Prussian, and before being called to Cracow was chief physician in the Berlin Charité and privat-docent in the Berlin University. Adamkiewicz's chief aim was the discovery of the specific carcinoma poison, and it appears that he was successful. If the poison isolated by Adamkiewicz is introduced into the organism of animals two distinct stages can be observed,—viz., one of excitation and one of paralysis. The action of the poison is initiated by an exaggeration of respiration and cardiac activity, dilatation of the pupils, salivation, and cramps; later on, stu-

nication by Minkowski himself ("Zur Lehre der Fettesorption," *Berlin. Klin. Wochensch.*, No. 15, 1890), it is pointed out that the absorption of fats depends on the form in which they are administered. A natural fatty emulsion like milk, and the emulsion normally produced by pancreatic juice, have certain characters in common, and differ from simple soap emulsions produced by alkaline carbonates. Simple alkaline soap emulsions are at once destroyed by the addition of an acid, while the fatty emulsion of milk, as well as that of the pancreatic juice, resist the action of acids. The importance of the pancreatic juice for the absorption of fats may depend on its power of forming an emulsion of this sort.—*Chicago Medical Recorder*, May, 1891.

ADAPTATION OF DIFFERENT ORGANS TO THE PROLONGED USE OF ATROPINE.

Little is at present generally known concerning the effects of the prolonged use of atropine. The most extensive experiments on this subject were made by Anrep (*Pflüger's Archiv*, Bd. xxi.), who observed that in dogs tolerance of the drug was easily producible, especially on the part of the nervous system and of the heart. He concluded that repeated injections of atropine gradually paralyzed the vagus endings in the heart, and that the motor ganglia were also depressed, so that the heart reacted less and less to the drug; finally, the heart became weakened, and was no longer able to accomplish the same number of beats as in the normal state. Dr. Luigi Sabbatino (*Lo Sperimentale*, May 15, 1891) has brought fresh evidence to bear on this subject, and has come to the conclusion that some of Anrep's results are only partially true. He finds (1) that the vagus adapts itself to the action of atropine, so that small doses, which will at first paralyze it completely, will, after a few repetitions, fail to produce paralysis; (2) that the adaptation of the heart to the drug is not due to depression of the motor ganglia, for, in his experiments, the heart-beats never slowed after the injections, but, on the contrary, were always quickened. His experiments were more extensive than those of Anrep, and were performed on frogs, rabbits, and dogs. The observations on frogs were made by immersing the animals for several days in water containing .08 per mille of atropine sulphate. Every four or five days a frog was removed, and the excitability of its vagus tested. At first no arrest of the heart could be produced on stimulation, but after several days' immersion this was again possible; the sinus and auricles could be arrested, while the ventricular pulse became slowed. He therefore concluded that in frogs the paralyzing action of atropine on the vagus diminishes with prolonged use. The experiments on rabbits (animals little susceptible to atropine) were made by giving daily and increasing injections of the drug. The animals remained perfectly well, and, on testing the irritability of their vagi, this was found to be almost normal after repeated injections, whereas single doses completely paralyzed the nerve. In rabbits, then, after prolonged use, atropine loses much of its paralyzing effect on the controlling mechanism of the heart. In dogs, experimenting in the same way, he found that, even after a considerable time, large doses would completely paralyze the vagus; but that small doses, sufficient under ordinary circumstances to paralyze it completely, would produce only a slight diminution of its irritability, so that stimulation of the nerve then produced not arrest, but only slowing of the heart. In these animals, therefore, the power of adaptation is not so complete as in frogs and rabbits, but is still marked. As regards the action of the heart, Dr. Sabbatino found that the first effect of an injection was to increase the frequency of its pulsations rapidly up to a maximum; this maximum was, however, of short duration, not usually lasting more than ten minutes, after which a diminution commenced, at first rapid, then more gradual, so that even twenty-four hours after injection the pulse-rate did not quite return to normal. Thus the drug produces a great frequency of the pulse, of which part is only temporary, and the remainder of long duration. Four hypotheses may be advanced to explain the above; stated briefly, they are as follows: 1. It may depend on the mode of elimination, which may be at first rapid, and then slower (this would not explain, however, the fact that, with repeated injections, the acceleration produced by each dose is less marked and less prolonged). 2. The drug may not only paralyze the inhibitory but it may excite the accelerator mechanism; and this view receives some support from the fact that the injections are followed by evident excitement of the nervous centres, which may also excite at first the accelerator centre in the medulla. 3. The third hypothesis is that of Anrep, who imagined that a depression of the intracardiac ganglia coming on after that of the inhibitory

apparatus might account for the subsequent gradual slowing. 4. The last and most probable hypothesis is that the great initial frequency is due to the transitory increase of blood-pressure produced by atropine. The inhibitory apparatus being paralyzed, the increased pressure would act as a stimulus to the heart, at first strong, but gradually becoming feebler with the fall of pressure; the accelerator centres may also be at the same time stimulated. From the diminishing effect of repeated doses, the author thinks that with use atropine loses this excitant action on the accelerator mechanism. As regards the action on the nervous centres, he agrees with Albertoni, who concluded (*Arch. f. Exp. Path. u. Pharm.*, 1882) that atropine at first increases the excitability of the brain, but that with repeated doses the excitability is neither so great nor does it diminish the possibility of producing epileptiform convulsions by stimulation of the cortex. The motor apparatus of the iris appears to be usually completely paralyzed, although in one rabbit, after several injections, exposure to a strong light would produce constriction of the pupil. This observation would correspond to the slight susceptibility of these animals to atropine. Some interesting observations were made on the prolonged action of the drug on the secretion of saliva and of sweat. The first few doses would completely mask the effect of pilocarpine subsequently given, but finally a tolerance seemed to be set up, so that pilocarpine would then produce a free flow of saliva and sweat. The tolerance of these mechanisms is, therefore, considerable, but is not prolonged much after discontinuance of the drug, for a further injection after an interval is found to be as powerful as ever. Finally, observations on dogs show that the intestinal nerves also exhibit to some extent a tolerance for atropine. At first the drug produced much intestinal irritation and diarrhœa, but this usually passed off after a few days, unless the dose was increased.—*British Medical Journal*, June 20, 1891.

THE GALLATE OF BISMUTH.

In a preliminary communication Drs. Heintz and Liebreich announce, in the *Gazette Médicale de Paris*, June 20, 1891, that they have found in the gallate of bismuth, which they baptize with the name of "dermatol," a topical application, which they recommend as a substitute for iodoform, in that it possesses all the properties of the latter substance, with the great advantage of being inodorous.

The gallate of bismuth occurs in the form of a fine powder, without odor, of a yellowish-saffron color, and of an aspect somewhat similar to iodoform. It is not hydroscopic, and does not decompose when exposed to the air or the light. It is insoluble in ordinary solvents, and consequently is free from toxicity, for when applied to a raw surface, such as that of a wound, it is absolutely incapable of absorption. It is said not to act as an irritant on the surfaces with which it comes in contact. It possesses considerable desiccating power, and to this extent acts as a stimulant. The authors state that their clinical experiments with dermatol, which have already amounted to more than one hundred, show that cicatrization is rapid and the formation of granulations favored, while the secretion of pus is diminished. They have used this salt in the treatment of burns, in eczema, in ulcerations, in ocular affections with painful morbid secretions, in affections of the nose and ears, and especially in otorrhœa; finally, they add that the gallate of bismuth may be administered internally in the dose of 30 grains, without producing the slightest symptom of poisoning, and it may thus be substituted for the subnitrate of bismuth in affections where this preparation is indicated.

INFANTILE PLEURISIES AND THEIR TREATMENT.

Dr. A. F. Plicque (*Progrès Médical*, January 31, 1891) summarizes his observations on the subject of infantile pleurisies and their treatment in the wards of Dr. J. Simon in the Hôpital des Enfants Malades, Paris. Pleurisy in infants is almost always secondary to some inflammatory or zymotic disease. Effusions have a marked tendency to become purulent, and in the case of children under four years pus is the rule rather than the exception. The collections of fluid are very prone to become encysted, and hence may be met with at any part of the chest, and not always at the most dependent portion. They are liable to burst internally, and the general prognosis is good, provided that the pus has free exit, either through the chest wall or through the lung. Such forms of effusion are, therefore, very different from the similar conditions in the adult. Owing to the almost constant complication with some other morbid condition in the chest, the diagnosis is frequently

difficult. Progressive dulness, with absence of respiratory sounds over the same area, are the only trustworthy signs. The gradual progress of the altered physical signs must be closely watched for a time before a certain diagnosis can be made. In the early treatment of infantile pleurisy the use of calomel and digitalis is recommended, and a protest recorded against the abolition of the poultice, which is believed to aid absorption and to prevent the progress of the disease to the purulent stage. Tapping should always be done at first with the aspirator, an antiseptic solution being used to wash out the cavity. Fluid should always be withdrawn slowly and gently, and the introduction of the antiseptic solution—lukewarm boracic solution is the best for the purpose—performed with equal care and deliberation. No fear need be felt in using large quantities of fluid to flush out the pleura; as much as five or six litres have been employed. If tapping fails to prevent the re-formation of purulent fluid, an incision must be made and irrigation carried out in the same way. The best point for incision in case of a general effusion is somewhat farther forward than in the case of an adult, the anterior axillary line being selected instead of the posterior line. In case of encysted fluid the incision must be directly over the point of localization. Frequent and cautious washing out of the cavity is advised in after-treatment. Estländer's operation is rarely necessary in the case of infants.—*Chicago Medical Recorder*, May, 1891.

CELASTRINE, THE ACTIVE PRINCIPLE OF CELASTRUS EDULIS.

It is stated in the *Revue Internationale de Bibliographie* for May 25, 1891, that Professor Mosso has succeeded in extracting an alkaloid from the celastrus edulis, which he terms "celastrine." Its general action on cold-blooded animals is excitation of the nervous system in the preliminary stage of poisoning with a small dose, with depression in the latter stage with a large dose. On warm-blooded animals, Professor Mosso states that he has constantly found but slight variations in the blood-pressure or the respiration; it produces stimulation of the cerebrum, and slight excitation of the spinal cord and vagus, and elevation of body temperature. It is a marked cerebral stimulant, and the author believes that its action is closely comparable with that of cocaine. Celastrine is the better stimulant of the two, as it produces no secondary depression and no functional disturbance.

THE DIURETIC PROPERTIES OF THEOBROMINE AND DIURETIN.

We have in previous issues of the Gazette detailed the results obtained by a number of investigators as to the diuretic action of theobromine. A number of additional data have recently been published, and have been analyzed in the *Medical Chronicle* for June, 1891, by Dr. D. J. Leech.

Schroeder first showed that caffeine produces its diuretic effect by stimulating the epithelial cells of the kidney, but that this influence is decreased owing to the contraction of the renal vessels which caffeine causes by its stimulating action on the vaso-motor centre. He showed, too, that theobromine, which only differs chemically from caffeine by containing one equivalent less of methyl, and which has less effect on the cerebral nervous system than caffeine, acts as a powerful diuretic in rabbits. He suggested, therefore, that it might be employed as a diuretic in man. Its high price prevented for some time this suggestion being acted upon, but in recent times it has fallen to one-tenth the price it formerly commanded, and Dr. Gram has made a series of observations on its use as a diuretic. He got some good results, but its action was unreliable, because absorption does not always take place; at times, too, it caused slight sickness. After trying several combinations of theobromine, he met with a compound of theobromine and sodium salicylate, which is very soluble in water, and is now sold under the name of diuretin. This salt is white, and soluble with heat in less than half its weight in water; and no precipitation takes place on cooling. It contains fifty per cent. of theobromine, and does not cause sickness.

Gram gives records of eight cases in which theobromine sodium salicylate was given. Five were cases of cardiac disease and three of renal disease. In a case of mitral insufficiency, with dropsy and albuminuria, 30 to 60 grains of theobromine caused very marked diuresis without increasing the amount of urea. Caffeine, given with paraldehyde, had subsequently similar but less marked effect in increasing the quantity of urine; digitalis was without influence.

In another cardiac case in which digitalis

failed, theobromine had, on two occasions, a very marked diuretic influence. Here, however, pericarditis supervened during diuresis following on the administration of theobromine. The quantity of urea passed was not altered.

In a third instance, in which strophanthus was of little service, theobromine sodium salicylate markedly increased the amount of urine passed, and this increase was accompanied by a considerable augmentation in the amount of the urea excreted.

In a fourth case, in which cardiac degeneration with mitral stenosis and insufficiency and albuminuria were present, the diuretic effect of diuretin was on three occasions very considerable, and a calcium salt of theobromine likewise increased the amount of urine. Here digitalis also produced some influence, but strophanthus, caffeine, and calomel proved useless.

In this case it is noteworthy that under the theobromine salt the urea decreased and the albumen was increased in amount.

In the fifth case the theobromine sodium salicylate salt, in doses of 180 grains daily, had a powerful influence in increasing both the water and urea; digitalis proved quite useless.

In three out of the five cases the influence of the theobromine salt was noticed on the same day, and on the day following the administration of the drug.

Of the three cases of nephritis reported, one was treated with theobromine, in doses of 45 to 60 grains daily; the diuresis only showed itself on the fourth day. The total amount of urea decreased when diuresis set in, while the amount of albumen increased somewhat.

In a second case the theobromine sodium salicylate had on three occasions a powerful diuretic influence; in the third,—a case of tuberculosis with nephritis,—the theobromine sodium salicylate not only increased the quantity of water, but the amount of urea also.

There can be no doubt that in Dr. Gram's hands the theobromine sodium salicylate proved a powerful diuretic. He does not, however, record cases (if any), in which he tried it without success.

He found no influence on the heart or circulation produced by the drug, and in the doses in which he gave it—45 to 90 grains—it caused no unpleasant after-effects, and did not affect the central nervous system.

Dr. Hoffmann says that, according to Vulpius, the preparations supplied under the name diuretin do not agree either in the amount of theobromine or in their solubility. He used the diuretin sold by Knoll & Co., which is a combination, he says, of theobromine sodium with salicylate of soda. It has a bitterish taste, and is best given in a five per cent. solution, with a little syrup and peppermint or fennel-water. From such a solution a little theobromine in a few days is precipitated. As diuretin is decomposed in the air, it is not well to order it in powder.

Diuretin is manifestly absorbed after it is taken, for the color-test shows its presence in the urine. In the fæces no trace of it can be found.

Hoffmann administered the diuretin in seventeen cases, whereof five suffered from pleurisy with effusion, one from peritonitis and pleurisy, two from leukæmia and dilatation of the heart, one from cirrhosis, one from acute nephritis, one from amyloid kidney, two from chronic nephritis, and four from organic heart-disease.

In all the cases of simple pleurisy the diuretin caused, on the day following administration, an increase in the secretion of water, in some cases small, but in some cases very large, the amount of urine being doubled or trebled. When the inflammatory condition was subsiding, the increased urine flow seemed to have a favorable effect in decreasing the exudation. Slight diarrhœa occasionally occurred. No other after-effects were noticed, although 75 to 105 grains were given daily.

In the patient where tubercular peritonitis and pleurisy coexisted, no diuretic effect followed the use of the drug, and it likewise failed in the case of liver cirrhosis. On the other hand, in the two cases of chronic nephritis, and in a case of acute nephritis, the diuretic effects seemed marked, but no effect was produced in a case of amyloid kidney complicating phthisis. The most marked instances of the diuretic action of the theobromine compound was seen in cardiac dropsy. In these cases, diuretin was, for the most part, only given when digitalis had failed, and Hoffmann records four carefully-observed cases of its marked diuretic influence in cases of cardiac disease. In twenty-four hours a slight increase of the urine was often noticed, which gradually reached its maximum in two to six days, the quantity falling when the dropsy decreased or the medicine was stopped. In some of the cases recorded the drug produced a marked increase several times, which quickly ceased when it was stopped. Sometimes several days elapsed

a solution of plumbic acetate. The odoriferous body in the urine is, therefore, in all probability methyl-mercaptan. Previous experiments by Professor Nencki and M. Sicker have shown that this substance is one of the products of fermentation of albumen, and also of gelatin, and that it forms one of the constituent gases of the large intestine. Indol and phenol are also derived from the putrefaction of albumen, and it is probable that other sulphur-holding bodies are similarly derived. As to its connection with asparagus, Professor Nencki quotes an interesting communication from Dr. O. Loew, of Munich, to the effect that asparagin contains an organic sulphur compound, and that it is highly probable that methyl-mercaptan is formed in the albuminous disintegration which takes place in the germination of the plant.—*Lancet*, April 11, 1891.

THE COMBINATION OF IODINE AND GLYCERIN.

If tincture of iodine is mixed with glycerin the latter will keep the skin moist to facilitate the absorption of the iodine. This is recommended by Dr. Hammond and may lead to a new Galenical preparation. Experiments are now in order to see how such a preparation will keep.—*Pharmaceutical Record*, June 18, 1891.

MEDICATED OILS FOR HYPODERMIC INJECTION.

Several fixed oils, particularly those of olive and almond, have for some time past been used by numerous European practitioners as vehicles for the hypodermic administration of certain remedies, and to some extent this has also been practised in this country.

In a recent issue of *Le Progrès Thérapeutique*, A. VICARIO points out the necessity of carefully sterilizing the respective liquids, and gives various practical hints, which we give here in abstract.

Preparation of the Solutions.—This is either made by simply mixing the ingredients, if liquid, or by producing solution by means of a water-bath, in which latter case the most volatile substance must be added after the others have become liquid.

Sterilization of the Solutions.—The liquid is placed in a sterilizing flask. (Pasteur's retort or Chamberland's pipette-flask is mentioned by the author. Any bottle with long and narrow neck, which may be stoppered with a pellet of cotton, may be used.) The flask is then heated in a sterilizing oven at a temperature of 120°.

Filling into Bottles.—The liquid is now transferred, under proper precautions, into previously sterilized small bottles. If a Chamberland's flask is used, which has a bent neck and is drawn out to a fine tube fused at the end, the latter is broken off after sterilization is completed, the tube pushed through the cotton stoppers of the small bottles, and the liquid thus transferred without risk of reintroducing germs or bacteria.

Formulas.—The most usually employed preparations, which are particularly used in *phthisis*, are the following:

Picot's Solution.

Guajacol, 5 gm. = 75 grains;
Iodoform, 1 gm. = 15 grains;
Olive oil,
Liquid vaseline, aa eq. parts to make 100 c.c. = 3½ fl. oz.

Pignol's Solution.

Eucalyptol, 14 gm. = 216 grains;
Guajacol, 5 gm. = 75 grains;
Iodoform, 1 gm. = 15 grains;
Olive (or almond oil), to make 100 cc. = 3½ fl. oz.

Morel-Lavallée's Solution.

Eucalyptol, 12 gm. = 185 grains;
Guajacol, 5 gm. = 75 grains;
Iodoform, 4 gm. = 60 grains;
Olive oil, to make 100 c.c. = 3½ fl. oz.

The hypodermic dose of these solutions is from 3 c.c. to 12 c.c. (50 to 210 minims) in twenty-four hours. Besides the above, there are also in use plain solutions, in olive or almond oil, of creosote (1 to 15), eucalyptol (2 or 4 to 10), etc.—*American Druggist*, June 15, 1891.

THERAPEUTIC PRECISION.

To illustrate the proposition made with regard to the simplification of therapeutics, the need of precision in our therapeutic endeavors may be cited. Let any practitioner consider his method of prescribing, let him enter upon an introspection of the motive and manner of executing it in any individual case. He will probably be surprised upon how illogical and uncertain a basis his whole *modus medendi* is constructed. The mass of therapeutic work we are called upon to do unfits us for precise work, for the recording of cases and results, and thus deprives us of the only rational basis for correct deductions. It is

extremely difficult to remedy this source of error, but the other source referred to, the shot-gun prescription, may be easily avoided.

By prescribing simple remedies possessing well-known therapeutic qualities, we may be reasonably certain of what we accomplish.

To illustrate from actual practice. The writer had occasion in his hospital service to treat a case of acute articular rheumatism in which salicylate of sodium had been ordered. His usual method is 20 grains every two hours until the physiological effect, tinnitus aurium, is produced. The house physician being still under the influence of his predecessor in the service, a man of unexceptional attainments, who had ordered 10 grains four times a day, asked, for his own instruction, an explanation of this difference in the method of prescribing so simple a remedy. The reply was that the object of the salicylate treatment was to relieve the arthritic pain, reduce the temperature and other manifestations, and that since these results are never completely attained until the patient is fully under the influence of the remedy, it is advisable to accomplish the latter as quickly as possible. Four or five 20-grain doses of salicylate of sodium administered every two hours will relieve these patients with almost mathematical precision, while 10 grains four times a day would act as a mere placebo until by accumulation the system is brought under the influence of the remedy. It would be just as rational to order for a patient suffering from an intense supraorbital neuralgia $\frac{1}{16}$ grain of morphia every two hours when a hypodermic of $\frac{1}{4}$ grain would relieve promptly because the system would be at once brought under the physiological effect (narcotic) of the remedy. Just so irrational is it to grope the way with small doses of quinine in malarial fever. If we have a genuine case of malaria, we have in quinine a specific; this specific action is best attained by cinchonization of the patient before the paroxysm is due. Clinical experience has established this as an axiom. Why scatter our forces over hours and days and obtain at last only the cumulative effect of smaller doses, when one or two full doses will protect the patient against the enemy? The same may be held with regard to many other remedies of less specific curative effect.

Take antipyrin, for instance. Why administer 5 grains every two hours and then trust to the probable accumulation of the remedy until its antithermic effect may be attained, when with one moderately large or full dose we may at once reduce the temperature? The patient's comfort is enhanced by the smaller number of doses, by the more speedy attainment of the result, and his safety is thereby secured with more precision and accuracy. Within the limits of safety, which in the case of most remedies are pretty well defined, it would seem to be the dictate of common sense to endeavor to obtain the most definite results by the largest necessary doses.

Not only from his own experience does the writer draw this conclusion, but the latter is warranted by the study of the teachings of the best clinical teachers.

There are some remedies in which a gradual advance in dosage is necessary, as, for instance, when Fowler's solution is prescribed for certain cases of chorea. Here the uncertainty of the effect, the frequent idiosyncrasies demand, and the chronic character of the disease warrants, the graduated dosage, although here too we are content when the physiological effects, irritation of the gastro-intestinal tract, œdema of the lids, etc., are manifest.

When our teachers will clearly define the therapeutic limitations of our remedial agents, and when we abandon the "t. i. d." habit of prescribing which clings to us like a barnacle from the hoary past, a long stride will be made in the direction of definite therapeutics. —*Dietetic Gazette*, June, 1891.

TYPHOID FEVER WITH ARTERIAL THROMBOSIS AND MANIA.

At the meeting of the Clinical Society of London, held May 22, 1891, DR. SIDNEY PHILLIPS related a case of typhoid fever with occlusion of the femoral artery during convalescence, and with acute maniacal attacks (*Lancet*, May 30, 1891). The patient was an adult male, and the attack was a mild one, but the heart's action weak and irregular from the first. During convalescence sudden pyrexial attacks occurred. The first rise was to 103°, with sudden pain in the right hypochondrium; the second to 103.4°, and the left common femoral artery became blocked, with absence of pulsation in it and in the popliteal and tibial arteries. Retention of urine occurred at the same time. The limb became powerless, with slight anæsthesia. There was slight œdema of leg and foot, and the affected limb became hotter than its fellow. The surface thermometer showed on one day a difference of five degrees. The rise of temperature lasted three weeks. Pulsa-

tion gradually recurred in the limb, which completely recovered. In the third attack of pyrexia the temperature rose to 103.2°, subsiding with epistaxis. The fourth, fifth, and sixth attacks of fever were accompanied by outbreaks of excitement, almost of acute mania, and in one the temperature rose to 106.1°. The patient eventually became quite well. Dr. Sidney Phillips said the plugging of the artery might have been from thrombosis or from embolism, probably the latter; such plugging of the large arteries was not very common as a sequela of fevers, and frequently led to gangrene, as in the case lately recorded in the *Lancet* by Dr. Drewitt. A rise of temperature in the affected limb after occlusion of the main artery was not usual, and even if the ordinary collateral circulation were sufficient to the temperature of the part up to the normal, it could not be credited with raising the temperature above the normal. It seemed probable that the shock of the embolism led to a reflex paralysis of the spinal centre, producing retention of urine, and the same shock in the same way led to a paralysis of the vaso-motor constricting nerves of the arteries of the lower limb, allowing an unusual hyperæmia. Dr. Gaskell had shown that these nerves originated in the anterior cornua of the spinal cord, and passed out in the anterior nerve-roots to the sciatic plexus. Anything, therefore, which would produce a paralyzing influence on the spiral centres for the bladder might also paralyze the centres of origin or the vaso-motor nerves to the arteries of the leg. Referring to the maniacal attacks, Dr. Phillips observed it was not common to get such attacks as immediate sequelæ of fever, with such rises of temperature, the patient being quite calm and the temperature normal in the intervals. Possibly they were embolic in origin, but more probably were only signs of functional nerve-disturbance in an emotional individual.

THE ACTION OF ANTISEPTICS UPON THE PERITONEUM.

DELBET, GRANDMAISON, and BRESSET (*Annales de Gynécologie et d'Obstétrique*, 1891) as a result of their united experiments and observations, arrive at the following conclusions:

1. The strong antiseptics, such as carbolic and salicylic acids, corrosive sublimate, and biniodide of mercury, present more disadvantages than advantages, since they irritate a healthy peritoneum, and thus favor the formation of adhesions.

2. The most useful solutions to be employed in laparotomy are one of sodium chloride (6 or 7 parts to 1000), and of boric acid (3 parts to 100).

3. Iodoform and salol exert but little action upon the peritoneum, and it is a question if they have any antiseptic effect.—*American Journal of the Medical Sciences*, July, 1891.

A CHEAP DISINFECTANT.

At this season of the year, and during the summer and autumnal months, disinfectants should be kept ready at hand for needed use, but not in any measure to take the place of cleanliness.

The nitrate of lead is the cheapest disinfectant known that fulfils its intent. It does not, however, prevent putrefaction. The chloride of lead is much more effective in all directions. It is made by dissolving a small teaspoonful of nitrate of lead in a pint of boiling water; then dissolve two full teaspoonfuls of common salt in eight quarts of water. When both are thoroughly dissolved, pour the two mixtures together, and when the sediment has settled you have two gallons of clear fluid, which is the saturated solution of the chloride of lead. A pound of nitrate will make several barrels of the liquid. The nitrate of lead costs from eighteen to twenty-five cents a pound at retail.—*Monthly Bulletin*, June, 1891.

ALKALINE SILICATES IN THERAPEUTICS.

Alkaline silicates have been little employed in therapeutics, being scarcely mentioned in the most recent text-books. It is shown, however, in *La France Médicale*, June 19, 1891, that these salts possess many properties which may be of therapeutic value. Silicate of potassium has been prescribed in various vesical troubles, and DR. BONJEAN mentions that the silicate of sodium dissolves uric acid with the greatest readiness, causing the elimination of a limpid, colorless urine, and in that it thus assists in the elimination of uric acid may prove of value in diseases where uric acid predominates. The administration of these salts, such as the silicate of sodium, in doses of 7½ grains, renders the urine alkaline, without interfering with the elimination of uric acid.

It has been used with more or less success in cases of gout, gravel, and chronic rheumatism. So also as a local application, the solution of the silicate of sodium prevents the de-

composition of pus, and thus is well suited as an application to putrid wounds, etc.

DR. M. SÉE has likewise used injections of silicate of sodium in gonorrhœa, and maintains that its effects are most satisfactory, as is also the case when it is used locally as an application to venereal ulcers.

A CASE OF POISONING FOLLOWING THE EXTERNAL APPLICATION OF TOBACCO.

DR. AUCHÉ, in the *Journal de Médecine de Bordeaux*, March 22, 1891, points out that, notwithstanding the powerful poisons contained in tobacco, its use as an external application is confined chiefly to popular medicine; also that, although certain smokers use large quantities, and some chewers absorb the juice daily, poisoning is nearly wholly due to the external application of the drug.

The different degrees of tolerance met with, he thinks, may depend to some extent upon the mode in which the active principles of the plant gains access to the system.

Having given a short description of some recorded cases of poisoning from the external use of tobacco in various forms, the symptoms noted being nausea, vomiting, hiccough, difficulty of breathing, excessive prostration, coldness of the extremities, cold clammy sweats, with a feeble and intermittent pulse, Dr. Auché describes the following rather anomalous case observed by himself:

A man suffering from pediculi pubis made a decoction by boiling two hundred grammes of tobacco in two litres of water. Some of this he rubbed over his whole body, and, having allowed his skin to dry without wiping himself, put on his clothes. A few hours later he again went through the same process. An hour afterwards, while working, he was suddenly seized with heaviness of the head, nausea, vertigo, and dimness of sight, cold sweating, and excessive pallor of the skin; also with marked trembling, and very great weakness of the arms and legs.

When seen, the face was exceedingly pale, and covered with a cold and clammy sweat; the extremities were cold, pallid, and a little cyanosed. The vertigo was constant, and more marked when sitting up. There was no headache; his thoughts were clouded. He could make out the general shape of objects, but their outlines were blurred; the pupils were a little dilated, but reacted to light and accommodation. Hearing was dulled. There was a continuous feeling of nausea, but the inclination to vomit was easily overcome.

The respiratory movements, beyond being weak, were normal. When interrogated with regard to his breathing, the patient said, "He felt as if he had a constriction around, or a weight upon, his chest."

The heart pulsations were 60; the apex-beat only feebly felt; the pulse small, thread-like, and scarcely perceptible. The genito-urinary system was normal.

The limbs trembled markedly, particularly the legs, when he attempted to stand. Sensation and the reflexes were normal.

After three hours the symptoms gradually disappeared, leaving only a violent headache. —*Medical Chronicle*, June, 1891.

THE CAUSE OF DIPHTHERIA IN RURAL DISTRICTS.

DR. LONGSTAFF, in a recent voluminous work on "Statistics, Social, Political, and Medical," makes an interesting study of the causes of diphtheria, more particularly, of course, as it occurs in Great Britain. He finds that it is a disease of the country rather than the city. Thus, for every thousand deaths from the disease in dense districts there are eleven hundred and seventy-eight deaths in medium districts, and fifteen hundred and seven in sparse districts. With regard to specific causes, Dr. Longstaff says, "The cause or causes should not be sought for, primarily, in any high development of civilization, such as sewers, but rather in some condition associated with more primitive modes of life. Again, privies and ash-pits can hardly be important agents in breeding or disseminating the disease, or we should expect to find diphtheria exceptionally prevalent in those northern towns where such nuisances reach their worst, whereas the contrary is the case. On the other hand, low vegetable organisms developed in damp dwellings would perhaps fit in with the facts that I have brought forward; or, again, some evil special to shallow wells or other primitive sources of water-supply. The line of investigation, however, which seems to me most promising, lies in comparative pathology. The peasantry live on intimate terms with domestic animals, more particularly cows, sheep, pigs, and poultry (including pigeons). Some little known disease of some one or other of these creatures may be capable of inducing in men or women, brought into frequent or close con-

tact with them, a trivial 'membranous sore-throat;' then, under suitable conditions of recipient and environment, the more generally-recognized form of the disease, 'true diphtheria,' or, as it used to be called, 'cynanche maligna,' may result. The poison, perhaps, gathering intensity and infectiveness, may then be conveyed into towns by farm produce, such as milk, cream, or poultry, conceivably by eggs, meat, or vegetables; and, lastly, through the person first infected, the sources of water-supply or the public sewers may get poisoned, and so, indirectly, aid in the spread of the disease."

The suggestion is one that country practitioners should bear in mind. At the same time it is quite possible that the lessened death-rate from diphtheria in large cities is due to a superior sanitary organization.—*Medical Record*, June 27, 1891.

PERMANGANATE OF POTASSIUM IN DIPHTHERIA.

Dr. Netzetzky says that his twenty-two years' practice convinced him that the best treatment of faucial diphtheria consists in an energetic use of permanganate of potassium. The drug should be administered in the shape of paintings and gargle. The following strong solution should be employed:

℞ Potassii permanganatis, ʒi;
Aquæ destillatæ, ʒi. M.
Sig.—To paint the affected surface every three hours.

For gargling, which is to be repeated as often, a teaspoonful of the same solution should be mixed with a tumblerful of boiled water.

In those cases in which the child is unable to gargle, the following mixture should be given internally:

℞ Solutionis hydrogenis superoxydati, two per cent., ʒii;
Glycerinæ, ʒii. M.
Sig.—A teaspoonful every two hours.

—*Medical Record*, June 13, 1891.

LOCAL USE OF MENTHOL AND EUCALYPTOL IN AFFECTIONS OF THE MIDDLE EAR.

Dr. Adolph Bronner, in the *Archives of Otology*, gives some interesting facts concerning the use of these remedies in certain diseases of the ear: "The most favorable cases seem to be those of chronic swelling of the mucosa, while in the initial stages of some cases of sclerosis I was inclined to think that I had prevented the encroaches of the disease. When the mucosa is greatly swollen, I direct the use of a snuff of boric acid with two per cent. of menthol, to be frequently used in small quantities, while at the same time I inflate the middle ear with the catheter and menthol vapor. A few drops of a twenty per cent. solution of menthol in olive oil is poured into an antiseptic capsule, and this is then firmly attached to the catheter." The capsule used is similar to the Hartman capsule, and the current is passed through by use of Lucae's modification of the Politzer bag. The vapor is slowly inflated, and much stress is put on the *prolonged use* of this agent upon the diseased mucosa. "I do not remember having produced any pain or inflammation from this procedure, and, on the contrary, I think that by the use of the menthol I have been able to relieve the slight occasional pain."—*Ophthalmic Record*, July, 1891.

Dr. Samuel O. L. Potter, Professor of Medicine in the Cooper Medical College of San Francisco, and a graduate of Jefferson Medical College of Philadelphia (with first prize, 1882), recently passed the required examination, and was admitted on April 30 last a Member of the Royal College of Physicians of London, forming one of a class of nine candidates, all of which were M.D.'s of British universities,—viz., three of Cambridge, one of Oxford, one of Edinburgh, two of London, and one of Aberdeen.

Those who understand the peculiar rank of British qualifications will recognize the M.R.C.P. of London as the "Hall-Mark" of the British medical profession, and that it is a coveted one may be seen from the fact that all the candidates therefor were previous M.D.'s or M.B.'s of universities, asking this as an additional honor. The qualification of this college, given at the ordinary final examination of students, is the license "L.R.C.P., London," and does not admit, as does the membership, to the college itself.

The only other Americans holding this qualification are Professor Osler, of Baltimore, and Dr. Robinson, of San Francisco. It is also held by two English practitioners in California, one in Washington, one in Canada, and one in British Columbia.

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Original Communications.

*CLINICAL THERAPEUTICS—LECTURES ON THE TREATMENT OF HEPATIC AFFECTIONS.**

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LECTURE I.—THE LIVER AS AN ORGAN OF ANTISEPSIS (PHYSIOLOGICAL CONSIDERATIONS).

GENTLEMEN:—I desire this year to devote my conferences in "Clinical Therapeutics" to some practical considerations on "Diseases of the Liver." We have here a subject for study which will, I hope, command much interest, and from which you will derive results useful in your practice, and I will, if you please, begin by some general considerations.

The great size of the hepatic gland has long attracted the attention of observers. The Chinese, struck by the color of this gland, attributed all the modifications of coloration of the skin to troubles having their origin in the liver. In Grecian antiquity it was on the aspect of the liver of animals offered in sacrifices that the Karuspices based their prognostications. Plato made of it the seat of the desires, and Hippocrates the origin of

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the veins. It was Galen who attributed to the liver the most important *rôle*. According to him, this organ furnishes to the blood the nutritive juices necessary for the formation of that fluid. Moreover, it secretes not only bile but atrabile; also all the dyscrasic maladies were, in the opinion of the physician of Pergamus, dependent on some hepatic derangement.

Do not forget, in fact, that the physicians of ancient Greece noted very frequently various disturbances which they referred to the liver. Hepatic congestions are very often observed in this part of our continent, and even to-day the Grecian physicians call attention to the frequency of bilious states as complicating inflammatory diseases.

Till the seventeenth century the doctrines of Galen dominated the medical profession, and a preponderant *rôle* was assigned to the bile, and especially to the atrabile, in the pathogeny of humoral affections. But a discovery made June 23, 1622, in the amphitheatre of anatomy at Pavia by Professor Gaspard Aselli, of Cremona, was destined to relegate the functions of the liver to a much humbler plane.

Aselli, on opening the abdomen of a living dog, had just made the momentous discovery of the chyliferous vessels, and, persuaded of the importance of this new fact of physiology, he uttered, like Archimedes on a similar occasion, the cry "Eureka!" Thereafter to these chyliferous vessels was attributed the important function which heretofore had been assigned to the liver.

Notwithstanding the influence of Paracelsus and Boerhaave, who espoused anew the teachings of Galen, and made of the liver an abdominal heart, these notions did not find acceptance, and the liver, considered as a simple excretory organ of the bile, henceforth occupied a place much inferior to what it once held in the glandular system of the economy.

At the same time, pathological anatomy had pointed out, rather as curiosities, certain interesting facts, but these remained isolated, unfruitful in practical applications, and we have to come down to the middle of the eighteenth century to find the first treatise devoted to the study of hepatic diseases; this treatise is the work of Bianchi, dates from 1725, and is entitled "Historica Hepatica." From this time successively appeared in England the treatises of Saunders in 1768, of Bath in 1777; and, lastly, the first French treatise was published in 1812, and was the work of Portal. This production is a weak performance, and is rather a reproduction of English works than an original monograph of the author.

Since that time very important works have been published on the pathology of the liver. Frerichs, in Germany, Murchison, Harley, Robert Saunby, in England, Charcot, Hanot, Gilbert, Chanfard, in France, have given us very precise data on the pathology of the liver, which will be utilized in the course of these lectures. But I cannot undertake to venture into all departments of this great subject, and must refer you for a more complete treatise to the second volume of my "Leçons de Clinique Thérapeutique," of which an English translation is published by G. S. Davis,* Detroit. In this course I have in view a different plan. Basing myself on the recent discoveries which physiology has made respecting the hepatic functions, I shall give you, under the head of general considerations, the clinical and therapeutic conclusions suggested by these researches.

These physiological investigations have restored the liver to the high position which it should occupy, and if we may say that by its volume and its weight it holds the first place among the glands, it must be acknowledged that from other considerations this pre-eminence cannot be claimed for any other organ. The liver has, then, regained to-day the pre-eminent importance which Galen assigned to it.

Considered in its entirety, the liver accomplishes two great functions. It is a digestive gland and a blood gland. As a digestive organ, the liver is the seat of important functions. It is a barrier interposed between the digestive tube and the rest of the economy to arrest and destroy the alkaloids and toxines introduced as food or medicine into the alimentary canal. It is, then, an antiseptic organ.

It is, moreover, an organ one of whose offices is the secretion of the bile, which, as you see, plays so considerable a part in the regular operations of the alimentary canal. Lastly, it is the organ of the function which is peculiar to it,—namely, that of regulating physiological glycæmia, whereby is furnished to the blood the proportion of glucose necessary for the functions of life.

We may still to all these great functions

* "Diseases of the Liver," G. S. Davis, Detroit, 1887; "Diseases of the Kidneys," G. S. Davis, Detroit, 1887.

add another,—*i.e.*, that of regulating the absorption and production of fat.

As a blood organ, not only may the liver be considered as an abdominal heart, but it also plays an important part in the metamorphosis of the globules, and in the production of combustions and of animal heat,—that is to say, in the genesis of urea.

Hence, then, to sum up, from the point of view of its digestive functions, we shall have to study an antiseptic liver, a biliary liver, a glycogenic liver, and an adipogenous liver.

From the point of view of its sanguineous functions, we shall have to examine an hæmatopoietic liver and a calorigenous liver.

I propose to study each of these functions of the liver separately, and will begin with the antiseptic liver. I shall leave to one side the adipogenous liver, but will dwell at some length on the various phases of function given above.

Each of my lectures will be divided into two parts. In the one, I shall inquire on what physiological and anatomical bases the function which I attribute to the liver may be established. Then, in a second part, I shall deduce certain clinical and therapeutic conclusions.

As you see, this is the plan which I have adopted in my "Clinical Therapeutics." The success of that work, which has just reached its sixth edition, shows the practical value of this method which characterizes those writings to which I have devoted so much of my medical life.

THE ANTISEPTIC LIVER.

When we take a general survey of the various phases through which has passed this interesting question of the liver considered as a destroyer of poisons, we see that we may distinguish three periods. In the first, it is the mineral poisons which were studied particularly. Orfila, then Paganuzzi and Lusanna, showed that mineral poisons accumulate in the liver. Arsenic, lead, mercury, and iron are found in this gland, and it is from that period that legal medicine began to insist on examinations of the liver in judicial autopsies, with the intent of seeking for traces of the poison which was supposed to have been administered.

In a second period, which begins in 1877, by the researches of Schiff, Hegger, and Jacques, the destructive action of the liver on certain vegetable alkaloids, as curarine, daturine, morphine, and strychnine, was studied.

Lastly, in a third period, it is no longer the destructive action of the liver on the vegetable alkaloids which is the object of inquiry, but the toxines and toxalbumines which the liver with extreme rapidity renders inert; and it is here that we place the important labors of Bouchard and the remarkable thesis of his pupil Roger, dated 1886,* from which I borrow the greater part of the facts which serve for the basis of this lecture.

What are the operative methods which physiologists have put in execution in order to study this special action of the liver on poisons? These procedures are numerous, and may be summed up in three groups.

The most primitive of these procedures—that which was put in operation by Orfila—consists in analyzing the hepatic parenchyma, and therein seeking for the metal which caused the poisoning.

Schiff employed a much more physiological method. He injected for comparison medicinal alkaloidal substances by the veins of the general circulation, and by the veins of the portal circulation. He then showed the different effects from a toxic point of view produced by the doses administered by these two channels. He employed chiefly as subjects of experimentation the rabbit and the dog.

In the case of the inferior animals,—the frog, for instance,—Schiff made use of another method quite as ingenious. This was to deprive the frog of its liver, an operation relatively easy, and which permits the animal to survive for three or four days. He then compared the toxic action of the vegetable alkaloids in sound frogs and in frogs deprived of their liver.

The Belgian experimenters, Hegger and Jacques, have employed a quite different method,—that of the artificial circulation of Ludwig. This is their *modus operandi:*

Immediately after having killed the dog and tied the portal vein, as well as the inferior vena cava, ablation of the liver is performed, that portion of the ribs and of the vertebral column which is adherent to the liver being preserved intact, as well as the diaphragm; the organ thus detached is placed on a stand, which allows a current of water or of blood to pass through the substance of the liver through its afferent and efferent vessels; a careful examination is then made to see what has become of the toxic agents which have thus been introduced by the portal vein.

* Roger, "Action du Foie sur les Poisons" (*Thèse de Paris*, 1886).

Add, finally, that Bouchard and Roger have also studied from a toxic point of view the blood of the general circulation and that of the portal vein; and, lastly, that of the inferior cava. Let us examine now, as briefly as possible, the results furnished by these different researches.

interesting production. Lastly, Roger has repeated all these experiments, and completed them.*

The following table, which I borrow from the latter work, will show you the evident action of the liver on the alkaloids, and how destructive this action is to certain of them.

Table showing the Action of the Liver on Alkaloids other than Nicotine.

Substances injected.	Species under experimentation.	State of the animal.	Where the injection was made.	Mean per kilogramme of fatal doses.
				Grain.
Sulphovinate of quinine	Hare.	Sound.	Vein of ear.	.06
			Intestinal vein.	.16
Muriate of morphine	Hare.	Sound.	Vein of ear.	.35
			Intestinal vein.	.68
Neutral sulphate of atropine	Hare.	Sound.	Vein of ear.	.41
			Intestinal vein.	.192
Hyoscyamine	Frog.	Sound. Without liver.	Lymphatic sac.	.2 .1
				Milligramme.
Sulphate of strychnine	Dog.	Sound.	Jugular vein. Mesenteric vein.	.285
Sulphate of veratrine	Frog.	Sound. Without liver.	Lymphatic sac.	.016 .119
Cicatine	Frog.	Healthy. Without liver.	Subcutaneous injection.	.075
Curare	Hare.	Sound.	Vein of ear.	.0024
			Intestinal vein.	.0066

I shall be very brief on the action of the liver upon mineral substances. Arsenic, copper, antimony, and mercury accumulate in the liver. Roger, who had resumed these experiments, has shown that the liver has no action on the salts of potassium and sodium; that, on the other hand, there is a very marked action on the salts of iron, the lactate and peroxide. When you inject by a mesenteric vein a solution of the lactate, the toxicity is three times less than when the injection is made by the veins of the general circulation.

I recall to mind while on this subject that Paganuzzi, of Padua, has already urged this very point, and that Lusanna has maintained that the reconstituent, and especially the hæmatopoietic effects of the medicinal doses of iron are due to the intimate action of the salts of iron on the hepatic cells; the ferruginous preparations introduced by digestion into the liver being eliminated with the bile and taken up again on the surface of the intestine by the portal vessels.

The action of the liver on the vegetable alkaloids is very important. Hegger was the first, in 1873, to indicate this destructive action, but we owe to Schiff the most interesting treatise on the subject; this work appeared in 1877. Three years later appeared the thesis of Jacques, a very complete and

The figures laid down in this table sufficiently speak for themselves; thus, with regard to quinine, the fatal dose for the hare per kilogramme of the weight of the body is 6 centigrammes, when the poison is injected by the vein of the ear, and it takes 16 centigrammes to produce the same result when the poison is introduced by the intestinal veins; almost three times the quantity.

In the case of atropine, the figure is still higher,—41 milligrammes by the veins of the ear and 192 milligrammes by the intestinal veins. The liver here destroys more than three-fourths of the poison.

In the case of hyoscyamine, when administered to the frog, without or with liver, the difference is almost double; it takes 2 decigrammes to kill the sound animal, and, if you remove the liver, 1 decigramme is sufficient.

But it is with nicotine that the destructive action of the liver attains its maximum, at least in the frog. In a sound frog it takes 34 milligrammes to produce death; remove the liver,

* Hegger, "Experiments on the Circulation of the Liver in Isolated Organs" (*Thèse d'Agrégation*, Brussels, 1873); Schiff, "Archives des Sciences Physiologiques et Naturelles," Geneva, 1877; Jacques, "Essai sur la Localisation des Alkaloïdes dans le Foie" (*Thèse d'Agrégation*, Brussels, 1880); Roger, "Action du Foie sur les Poisons" (*Thèse de Paris*, 1888).

and 8 milligrammes suffice. And *à propos* of nicotine, there is an operative method, of which I have not spoken to you, and which well shows that it is the hepatic tissue which acts in this case. The method consists in triturating the alkaloid with hepatic substance, then in making the injection in the veins of the ear, and this is what is observed: while without trituration it requires 7 milligrammes per kilogramme of the weight of the body to kill the hare, after trituration with the live tissue it takes 15.34 to produce mortal effects.

What therapeutic consequences may we derive from these results? Consequences of the highest interest. This destruction of vegeta ble alkaloids by the liver explains to us the great difference which exists between the administration of medicaments by the mouth and by the hypodermic method.

When given by the mouth, the medicaments may be modified by the action of the gastric juice and of the digestive juices; but, above all, they encounter this living barrier,—the liver,—which destroys them in part. There is nothing like this when the medicine is introduced subcutaneously, and you readily understand the advantage of utilizing this channel when we want to get the full benefit of active alkaloids.

Moreover, this fact was known long ago in its application to curare and the venom of certain serpents. We know, in fact, that one may practise suction of wounds made with poisoned arrows, or even of the bites of venomous animals, without experiencing the least poisonous effect; and Claude Bernard has even carried the analysis of this problem farther with curare, in showing that it is not to the gastric juice that we owe this diminution of toxicity, since, in injecting a mixture of gastric juice and curare under the skin, he caused the death of the animals, just as when the curare was used alone. To-day we have an explanation of this fact by the destructive action of the liver.

It is probable that the liver does not completely destroy the alkaloids; it seems to store away a certain portion, which later on is eliminated by the bile and poured into the intestine. It is this fact which explains the accumulation of doses in the case of certain alkaloids or glucosides. We, in fact, see daily therapeutic doses continued for a long time determine toxic effects. It is probable that we may explain this fact either by supposing a diminution in the destructive action of the liver, or that the bile, on being poured into the duodenum, carries with it a certain quantity of the toxic product, which adds itself to that introduced by the mouth, and thus transforms the therapeutic into a toxic dose.

But the most interesting point in this question of the antiseptic liver is that which concerns the organic alkaloids. Some physiologists have been long struck with the fact that, despite the introduction into the digestive tube of numerous toxic substances, the individual did not experience symptoms of poisoning, and Stich was the first to express the opinion that there must be some place in the economy where these substances were neutralized. This point he believed to be the intestinal mucosa, which constituted for him a veritable dialyzing membrane opposing the absorption of poisons contained in the intestine. Hofmeister attributed this same property to the white corpuscles.

Then, after the publication of Schiff's researches, this destructive *rôle* was attributed to the liver, and it was Lautenbach who first gave most precise expression to this fact. He maintained that not only does the liver destroy poisons introduced into the economy, but also that in the physiological state the organism produces a poison which is destroyed by the hepatic gland as fast as it is formed. The work of Lautenbach appeared in 1877, and nobody had then heard of the labors of A. Gautier, and the wide application which he gave to his discoveries.

Since then the investigations of Bouchard and the splendid experiments of his pupil Roger have enabled us to affirm that one of the most important functions of the liver is to destroy not only the toxines introduced by the food, but also those which are fabricated by our living organism; it is on this latter point that I wish to dwell during the remainder of this lecture.

Whence come these toxines? They have four origins. First, from food introduced into the stomach. As we often make use in our daily fare of meats from animals which have been killed for several days, we thereby ingest a certain number of toxic ptomaïnes. I do not design to return to this question of alimentary ptomaïnes, which I have many times taken up in my lectures in this amphitheatre, and will refer you in particular to the lectures on prophylaxis by alimentation and the vegetarian regimen.*

The second source of ptomaïnes is found

* THERAPEUTIC GAZETTE, 1889, "Prophylaxis by Alimentation;" *ibid.*, March 15, 1890, "Vegetarianism from a Therapeutic Point of View." etc.

in the fermentations which take place in the interior of the digestive tube. Tanret was the first to show that the gastric juice, in acting on albuminoid matters, furnished bodies with alkaloidal reactions. Since then it has been demonstrated that there are produced, especially in alterations of the mucous membrane of the stomach and intestines, a great number of toxic substances, whose aggregate constitutes what may be called intestinal putridity.

The third source is found in the numerous microbes which exist in the normal or abnormal state in the digestive tube from the mouth to the anus, microbes which secrete both diastases and toxines.

Lastly, the final source is the life of the cells. Gautier has shown, in fact, that the organic cell fabricates toxines, just as the vegetable cell does, and these toxines find in the intestine a channel of elimination. We shall even see, when I come to speak of the liver as a biliary organ, that the bile constitutes a medium of elimination for these toxines, more active, perhaps, than the kidney.

To sum up, then, from these multiple origins results the undeniable fact that the intestinal contents enclose a great number of toxic alkaloidal substances, which might easily enter the circulation if, thanks to the portal circulation and the antiseptic function of the hepatic cells, they were not at each instant destroyed and neutralized.

How may we demonstrate experimentally the antiseptic preservative *rôle* of the liver? By two processes, which furnish us positive data.

The first consists in taking a certain number of toxic products found in the intestine and inoculating them in animals,—the hare, for instance,—using at one time, for purposes of comparison, a vein of the general circulation,—the vein of the ear, for instance,—and at another time a branch of the portal vein; or, if one prefers, one may operate with the same products on healthy frogs and on frogs deprived of their livers. This is what Roger has done, and the following table shows to what results he has attained.

Substances injected.	Hares.—Injection by		Relation between the toxicities following the channel of injection.
	Peripheral vein.	Portal vein.	
Putrid matter, alcoholic extract	22.2	54.2	2.26
Peptones	1.69	4.07	2.4
Muriate of ammonia	0.39	0.34	2.4
Carbonate of ammonia	0.248	0.401	1.617
Lactate of ammonia	0.634	1.13	1.79
Alcohol	7.77	9.44	1.21
Acetone	6.94	6.96	1.00
Glycerin	10.7	8.07	1.00
Beef bile	4.0	6.00	1.5
Human urine	34.28	67.42	1.96
	Frogs.		
	Without liver.	Healthy.	
Alcoholic extract of intestinal matters { of hare	7.7	27.7	3.59
Alcoholic extract of intestinal matters { of dog	9.37	19.23	2.06

This table puts in clear light the preservative *rôle* of the liver.

But the second mode of procedure gives results still more striking; it consists in studying the varying toxicity of the blood in the hepatic veins and in the portal vein.

If what I have told you is true, the blood of the portal vein should be much more toxic than that of the hepatic veins. Now, the table which follows, which sums up the experiments of Roger, confirms absolutely my assertions.

TOXICITY OF DEFIBRINATED BLOOD OF THE DOG INJECTED INTO THE HARE.

	Average toxicity per milligramme of the hare's weight. C.c.
Blood in general	24.4
Blood of the hepatic veins	23.3
Blood of the portal vein	9.0
	Mean toxicity to the kilogramme of a hare.
Blood in general	24.4
Blood of the hepatic veins	23.3
Blood of the portal vein	9.0

Now, we see that while the blood of the hepatic veins is of a toxicity slightly inferior to that of the blood in general, being represented by 23.3 cubic centimetres per kilogramme of the weight of the hare, that of the portal vein is represented by 9 cubic centimetres,—*i.e.*, by a figure almost three times as great.

So, then, I have shown you, and that, too, in a way that cannot be gainsaid, that the liver arrests and renders innocuous not only mineral poisons, but also vegetable alkaloids and animal toxines.

In what point of the liver is this special antiseptic property seated? Here also Roger has endeavored to press the problem as far as possible. He has shown, as I have already told you, that it is the hepatic parenchyma which has this special property, since it is sufficient to blend with the toxic substances particles of the liver in order to diminish the toxicity of these products.

It is probable that it is in the hepatic cell itself that the destruction of these poisons takes place, for, according to Roger, there is always a direct relation between the glycogenic functions of the liver and its antiseptic functions. Roger thinks even that perhaps the sugar, or some modifications of the glycoses, may, by their action on the vegetable or organic alkaloids, diminish their toxic properties.

These points being now established, let us examine what conclusions clinical therapeutics may derive from them for the treatment of diseases. This will be the subject of the next lecture.

THE TREATMENT OF URÆMIC COMA AND CONVULSIONS.

By John Ferguson, M.A., M.D. (Toronto), L.R.C.P. (Edin.),* Toronto, Canada.

THERE are few questions of greater moment to the active practising physician than the treatment and management of cases of uræmia, with the concomitant coma and convulsions. That much can be done is a matter of congratulation; and, if the proper steps be taken in such cases, many precious lives may be saved that would be lost were the application of remedies ill-timed or unsuited. As the object of this paper is purely a therapeutic one, pathology will only be introduced as occasion may require, for the purpose of making clear any certain therapeutic procedure.

When from some cause or other there is a nephritis, and a free elimination of albumen in the urine, we know that other products are being retained in the blood that are bound to effect serious damage or cause a fatal catastrophe. The quantity of uric acid and urea thus retained has given rise to the terms uræmic coma and uræmic convulsions. In the therapeutics of such cases, we must have regard to two main points,—the elimination from the blood of these constituents and the improvement of the condition of the kidneys, so as to get them as speedily as possible to do their work more nearly after the normal standard.

Should we be fortunate enough to see the patient before the advent of coma or convulsions, the best course to adopt is to put the patient to bed, even although the amount of albumen in the urine be not great, say not more than five per cent. The effect of rest for a period has a very marked influence on the amount of albumen eliminated daily by the kidneys. Muscular exertion causes a much greater quantity of albumen to appear in the urine than would be the case with the passive condition of rest in bed. Such mild cases are not at all common in connection with scarlatina, diphtheria, exposure to wet cold, or during pregnancy.

With regard to diet, farinaceous and vegetable food may be used in fair quantities. The only animal food, however, should be milk. This is a matter of prime importance, as the formation of uric acid in the system is reduced to a minimum, the chances of severe complications greatly obviated, and the work of the kidneys lessened very materially.

The administration of medicine is important. The drug I like best in these cases is magnesii sulphas. This I always give in the form of a concentrated solution; and in such doses, undiluted, as shall move the bowels from four to six times in twenty-four hours. In mild cases it is not necessary to give diuretics. In any case, however, where there is uræmia or uric acidæmia, the pulse has a plus tension, and to relax this is often of much service in the management of these attacks of albuminuria. For this purpose I have tried the chief arterial depressants, and can speak in terms of greatest confidence of salicylate of potassium or sodium, aided by a good preparation of aconitine

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The salicylates cause free perspiration if the patient be well covered with bedclothing, while at the same time they wash out of the system the uric acid in the blood, which keeps up a hard pulse and tends to produce convulsive movements. As the magnesium sulphate is unirritating, its use may be continued for any necessary time.

But let us take a case a grade worse. It may be after scarlatina, or during pregnancy, or from some other cause. The urine is very much loaded with albumen. There may be a half or more of the total volume coagulum when tested. The hands and face are swollen; the patient has headache, sometimes very intense; muscæ volitantes are seen before the eyes; there is often a feeling of vertigo; the eyesight is usually somewhat impaired, sometimes very much so; and there are often twitchings of the muscles about the face. To this latter condition let me call special attention. If the albumen be abundant, and muscular twitchings appear while talking to the patient, I would emphasize the statement that the patient is on the very threshold of a crisis. Convulsions and coma may occur at any moment.

Get the patient to bed at once, if not there already. Allow nothing but the drinking of liquids, such as barley water, milk and hot water, very thin gruel, or simple water.

It is necessary to get both free action of the skin and bowels. For this purpose I would suggest as a single dose ten grains of calomel, thirty grains of nitrate of potassium, and put on this one drop of croton oil to carry all rapidly along. Put abundance of bedclothes on the patient, and warm irons or bottles around the body. The combination suggested above will act well on both skin and bowels, and no doubt the calomel carries away much of the uric acid that is so liable to cause convulsions when in the blood to excess.

My own opinion of pilocarpine is not very high in puerperal cases, as I have known convulsions come on speedily after the administration of this agent. This is likely due to the feeling of dyspnœa and suffocation experienced after its use; an irritation that is quite sufficient to cause the onset of convulsions, as the patient is in the condition ready for such an explosion. If pilocarpine is given, I would advise the use of a hypodermic injection of morphine about half an hour prior to the hypodermic injection of pilocarpine. This is a good course to pursue, as the morphine aids the action of the pilocarpine, and at the same time controls the tendency to convulsions.

By these means there will soon be free action of the skin and the bowels. The hard pulse will soon become soft. The poisons in the blood are soon washed out, as the free action of the skin and bowels induces great thirst; and the liquids already mentioned are drunk in large quantities, which still further dilute the poisons and help in their removal. The albumen in the urine lessens in amount rapidly, and the kidneys begin again to perform their regular functions.

There is one point on which I wish to be very emphatic. Your patient is in bed, or you give him orders to go there. Now, we know that in all those cases of renal anasarca the swelling about the head is most in the morning, after the recumbent position of the night, and on rising the patient has the greatest amount of headache. The explanation is clear. The hydræmic condition of the brain is increased by the recumbent position, and with this dropsy of the brain and meninges, there is a vast increase in the amount of poison acting on the nervous matter. Thus we have damage to it, both mechanically by pressure and toxically from the urea and uric acid, and perhaps other poisons.

Now, the point I mention is to see to the position of the patient. Elevate the head of the bedstead. The patient being in bed, I would say raise the head of the bedstead from one foot to eighteen inches. The effects of this position soon become apparent. The œdema about the head subsides, the hydræmia of the brain lessens, the pressure on the brain is reduced, and much of the poison in it is removed. By this means alone I have known persons with uræmic headache, albuminuria, cephalic œdema, and loss of sight greatly relieved. On the other hand, I have seen the crises of coma and convulsions ushered in by the patient assuming the recumbent position. The headache steadily increases, visual disturbances became hourly more marked, the swelling of the face persistently grows more, the hydræmia of the brain is exaggerated, and the toxic agents acting on the brain accumulate. All these conditions are benefited by the simple device of raising the head of the bedstead, as just indicated.

Having once acted on the bowels freely with the calomel, croton oil, and nitrate of potassium, continue to move the bowels freely by means of the Epsom salts, in the manner already stated, of giving it in satu-

rated solution, undiluted and often, so as to obtain free purgation.

By means of bedclothing and hot drinks free diaphoresis may be kept up for days, if necessary. To aid in this sweating process and the washing out of the blood the uric acid and urea, nothing will give such good results as the salicylates of sodium or potassium. The amount of diaphoresis obtained in this way, with a system loaded with liquids, is tremendous. This plan has the advantage that it not only washes out, but it also dissolves out the poison in the blood.

But suppose the condition is that of a pregnant woman, and you have the added condition of convulsions to deal with, as well as the albuminuria and coma. In this condition, first of all and at once, give a hypodermic injection of morphine, from ⅓ to ½ grain, and hold yourself ready to repeat it if needed. Then raise the head of the bedstead at least eighteen inches. Give then at least ten grains of calomel, with one or two drops of croton oil and thirty to sixty grains of nitrate of potassium. Cover the patient with abundance of clothing, and pack warm bottles or irons around her. When the convulsions have been controlled by the morphine, and the patient is well under its influence, then is the time to give, if you wish, the pilocarpine, in doses of from ⅙ to ½ grain, hypodermically. But I have already stated that I am not very partial to the action of pilocarpine, and by the proper use of other means there is fortunately not so much need for its use as a diaphoretic. Should, however, it be thought well to use it, I would recommend that it be always given a short time after the morphine, as in this way much of the unpleasant effects of the pilocarpine is obviated.

To obtain free and rapid sweating is most important in all those cases where there is much albumen in the urine and impairment in the action of the kidneys. A plan, which I suggested in the *American Journal of Obstetrics* some years ago, I would again mention. It is to wrap around the patient's waist a large piece of flannel wrung out of hot water, and then to put around the patient outside of this a piece of mackintosh or rubber cloth. In this way the patient is soon thrown into a very free perspiration, which can be easily maintained by plenty of clothing, hot drinks, and warm packs.

After the primary danger is over, maintain the free action of the bowels by means of the Epsom salts in saturated solution, the free action of the skin by salicylates, and keep the patient lying in the inclined position, with elevated head. This position may be maintained for one, two, or three weeks, as required, with great relief to the patient. In all those cases of uræmic headache, with swelling about the face and hands, I have come to attach a very great deal of importance to the position first described. As long as the patient is able to keep on her feet and go about, she escapes very frequently the severe symptoms of violent headache, coma, or convulsions. When labor comes on, however, and she is forced to assume the recumbent position, together with the fulness of the cephalic vessels that attends parturient efforts, the hydræmia and uræmia of the brain rapidly increase, and then the convulsions commence.

I would sum up the whole question thus:

1. In cases of albuminuria of moderate amount, give the saturated solution of magnesium sulphate.

2. If the case be more acute and urgent, put the patient in bed, with the head elevated.

3. If there be severe headache, any muscular twitchings, or tendency to coma, give at once a dose of calomel, croton oil, and nitrate of potassium, and then maintain the action of the bowels by means of the salts.

4. Induce free prescription by extra clothing, warm packs, hot drinks, and salicylates.

5. Allow no animal food but milk, and give liquids very freely.

6. If there be any convulsions, at once give a hypodermic injection of morphine, and follow it by the pilocarpine, if in the mean time sufficiently free diaphoresis has not been obtained.

7. In the case of pregnancy, if labor has not set in, and it is thought necessary to induce it prematurely, by all means push the above treatment vigorously, and try to obtain some considerable improvement in the patient's condition, especially in the kidneys, before the labor is induced. In some cases, by the above treatment, the kidneys speedily regain their proper functions, and it becomes unnecessary to interfere forcibly with the course of gestation. Should such a recourse be ultimately unavoidable, the patient is in a better condition to stand the additional strain.

8. In all cases of albuminuria, and especially in those of pregnancy, there is deficient action of the skin, as well as a marked reduction often in the quantity of urine passed per diem. To get the skin to act freely almost invariably increases the flow of urine. To

remove the hard, tense pulse, cause free perspiration, dissolve out of the system the excess of uric acid in it, due to the small urine flow, I would strongly advise the use of salicylate of potassium or sodium. A good deal has been said about these drugs irritating the kidneys. This, I think, is sometimes akin to the fear that too many have towards a quieting dose of opium in the sleeplessness often found in cases of albuminuria. The salicylates, I contend, neutralize the uric acidæmia, soften the pulse, permit, if they do not cause, free sweating, and carry from the blood a factor of great disturbance,—uric acid. It is not necessary to continue their use long, a few days at most will suffice, when the case may usually be safely left to the Epsom salts. With reference to opium, I have noticed the very hard, tense pulse of uræmia become soft and full in half an hour after the administration of the morphine hypodermically.

9. In five cases of uræmic convulsions, where I have had an opportunity of examining the urine, there was an excess of uric acid in the urine, and consequently an excess in the blood. The importance of this is very great, as uric acid in the blood in excess tends to cause convulsions.

264 College Street.

ARSENIC IN PERNICIOUS ANÆMIA.

By E. A. Barton, M.R.C.S., London, England.

THE following case, as illustrating the value of arsenic in pernicious anæmia, is not without interest:

J. A., a coachman, came to me on November 25. He then stated that he had always been a pale man, but for the last three months had been feeling very weak, and became quickly fatigued upon the smallest exertion. For the last two or three weeks he found that there was blood in the mouth on waking in the morning. The patient was tall, very thin, and intensely pale; the conjunctivæ were lemon-colored, the hands pearly white, and the ears looked transparently waxy. The gums were pallid, large, and very spongy, and at the junction of the teeth and gums a thin line of blood was visible. The tongue was clean and very pale, and the lips bloodless. There was no œdema of the ankles. Altogether he looked like a man who had recently suffered a severe hemorrhage. He was short-breathed, and felt faint when standing. The lungs were quite healthy. There was a soft systolic murmur over the cardiac area, probably anæmic in origin. A venous hum in the neck was most marked. The pulse was soft, of low tension, but not markedly accelerated. The urine contained one-sixth albumen, and was very pale in color. Three grains of the sulphate of iron was ordered thrice daily.

A fortnight afterwards I had the opportunity of making a careful examination of the blood. The corpuscles were found to be only eighteen per cent. of the normal number, while the hæmoglobin was twenty-three per cent. The corpuscles themselves were of various sizes, and formed rouleaux satisfactorily, but were soft and plastic. There was no leucocytosis. The blood appeared to the naked eye obviously pale and watery. The urine at this time contained the merest trace of albumen, which entirely disappeared in a day or two. On examination of the eyes it was found he could not read ordinary print, and that there were large hemorrhages into both retinæ, especially on the right side. The iron was discontinued, and liquor arsenicalis was ordered in 5-minim doses thrice daily. He was ordered to remain at home, and was allowed the most generous diet.

Four days after the commencement of the arsenic he had a fit, but when I arrived he had partially recovered, and was fairly sensible, with no paresis. He volunteered the statement that he now saw a red color when looking at the light.

A week after the commencement of the arsenic (which was never increased beyond 5 minims thrice daily) there was no further bleeding from the gums. He had complained for a fortnight of a beating noise in the head, "like a steam-engine." This (in all probability the beating of his own heart) ceased now to annoy him. The urine was normal but very pale. He was allowed to move about his room. His appetite was extraordinary, and, beside the most nutritious diet of strong soups, meat, etc., he took three to four pints of milk daily.

In three weeks he was able to walk half a mile without fatigue, and in a month returned to work. The corpuscles on January 16 (five weeks after the commencement of the arsenic) were seventy-six per cent. of the normal number, and the hæmoglobin sixty per cent. of the normal quantity. The hemorrhages into the retinæ had entirely disappeared, except for a slight blur on the right side. He could read small print and saw plainly. He con-

tinued the arsenic for another five weeks, and is now quite well.

Remarks.—The recoveries from pernicious anæmia are rare, and the diagnosis of the disease is usually equivalent to a death-warrant. In the case just cited the quantity of hæmoglobin and the number of corpuscles per centum were practically the same, showing that each corpuscle contained its proper amount of hæmoglobin. The disease, then, was one in which there was an extreme diminution in number of corpuscles. The hemorrhages into the retinæ, from the gums, and probably the kidney, gave a grave import to the disease, and the fit or convulsion was, I think, attributable solely to the profound anæmia. The rise in number of corpuscles, and the coincident rise in quantity of hæmoglobin, in one month, to thrice the amount under the administration of arsenic, proves the enormous benefit obtained from the drug.

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ON THE TREATMENT OF CHRONIC AFFECTIONS OF THE LARGE INTESTINE, AND IN PARTICULAR OF THE RECTUM, BY INTESTINAL ANTISEPSIS.

By Professor Dujardin-Beaumetz, Paris, France.

FOR several years I have had occasion to observe numerous cases of chronic affections of the large intestine, and in particular of cancer of the rectum, which have been very much benefited by the employment of intestinal antisepsis; and these facts have seemed to me sufficiently interesting and instructive to be worthy of communication to the readers of the Therapeutic Gazette.

Of late years surgeons have proposed a series of operations of greater or less gravity to remedy the discomforts of cancer of the rectum; and thus excision of the bowel has been recommended by Verneuil, ablation of diseased portions by other surgeons, an operation which is rendered easy by resection of the sacrum. Our colleague, Routier, has cited some very interesting observations relative to facts of this kind.

I believe that, without calling in the help of surgery, one may obtain results almost as good by intestinal antisepsis. For three years past I have been treating patients manifestly affected with cancer of the rectum, one of these a patient that was referred to me by Dr. Dubuc, the other two cases were females suffering from the usual symptoms of the disease. In all these patients rectal examination, the discharge of ichorous material, and the symptoms of intestinal occlusion enabled me to affirm the existence of cancer. Nevertheless, I was able to obtain by means of vigorous antisepsis such an improvement that these patients have gained flesh, and are today in a comfortable state of health.

I believe, in fact, that a great many cases of cancer of the rectum resemble by their slow evolution certain uterine neoplasia, which may exist for years without compromising the life of the patient, and which only cause death by obliteration of the ureters and the grave consequences therefrom resulting. Moreover, in cancer of the rectum, whenever we can do away with the evils resulting in obstruction in fæcal matters, and prevent the dangers due to stercoræmia, we can maintain a general state of health sufficient to enable the patient to increase in weight and maintain a comfortable existence.

The means of which I avail myself are these: First, certain local means; second, antiseptic and purgative medicaments, introduced by the mouth; third, a vegetarian diet.

Under the first head, I counsel rectal irrigations. I make use of Cantani's enteroclyster, and I generally employ a Debove tube No. 2 furnished with a funnel, and I manipulate this siphon just as I do when I wash out the stomach. After having greased the tube, I introduce it as far as possible into the rectum, with the patient in a horizontal position; and, having filled the funnel with a quart or more of the solution, elevate it, and allow the contents to flow into the intestine. An ordinary fountain syringe, such as is used for vaginal injections, answers very well, with the addition of a curved rectal canula.

I employ a solution of naphthol,—the most soluble and the least toxic of the naphthols,—and the strength of the preparation is about four grains to the quart of water.

I generally introduce from a quart to a quart and a half, or even two quarts, of this solution. It is not necessary that the patient should retain these injections, but he may let them pass almost immediately.

As for medicaments introduced by the mouth, I make use of antiseptics and purgatives. Among the antiseptics, I recommend particularly salol, which, as I have before told you, I regard as the best of intestinal anti-

septics, and ordinarily I employ the following formula:

℞ Salol,
Salicylate of bismuth,
Bicarbonate of sodium, āā 10 grammes (150 grs.). M.
Divide into thirty powders.
S.—One powder before breakfast and dinner.

The proportion of these ingredients may be varied *ad libitum*. Thus the quantity of salol may be increased to three or four grammes a day.

I insist, moreover, in keeping up free action of the bowels, and this is, doubtless, the difficult part, for, despite all the care you may take, there is always tendency to loading of the intestines, and every four or five days the patients will have colics and a profuse diarrhœal discharge. The preparations which I ordinarily use are the purgative mineral waters, the laxative powders, or cascara sagrada or cascarine. The laxative should be such as is best tolerated by the stomach. It is necessary that the patient should have one stool at least every day.

Lastly, as auxiliary and complementary to this treatment, I order a vegetable diet. I need say but little as to the details of this dietetic regimen, of which I have several times spoken at these conferences. Patients should be nourished exclusively on milk, eggs, cereals, fresh vegetables, and fruits; this is the regimen which reduces to the minimum the alimentary toxines (see the lecture on "Vegetarianism," in the THERAPEUTIC GAZETTE, March, 1890).

Such are the great lines of treatment which I have adopted in cases of cancer of the rectum. Can we expect to benefit all cases as much as those which have been the subject of my recent observations? I do not think so. At the same time, whenever the cancer does not cause very much intestinal constriction, and it is possible to obtain a sufficient clearance of the bowel, I believe that we can obtain quite satisfactory results from the means which I have indicated.

But this same method of treatment is just as applicable to other affections besides cancer of the rectum, and I have had good success in the treatment of chronic inflammations of the large intestines, and in particular in glairy and pseudo-membranous colitis.

We know how frequent this glairy colitis occurs in certain patients, and particularly in females. I may here mention that I often replace my naphthol lavements by lavements of tincture of iodine, in the proportion of 10 grammes of the tincture to a quart of water. I continue, at the same time, my powders of salol, my laxatives, if the patient is constipated, and the vegetable diet.

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*NIHILISM IN MEDICINE.**

BY CLARENCE L. DODGE, M.D, KINGSTON, N. Y.

NIHILISM in therapeutics would perhaps be a more appropriate title for this paper, as it is in this branch of the science of medicine that the "do nothing" policy is noticeable.

Under such designations as "conservative medicine," "expectant treatment," "symptomatic treatment," etc., a system of practice has been inculcated of late years which has been indirectly, at least, productive of harm.

One of the results of Hahnemann's teachings—since he practically gave his patients no medicine whatever—was to prove to the medical profession that many acute diseases tended intrinsically to recovery if simply let alone. This was previously thought to be impossible, hence faith in drugs was somewhat shaken, and, as is always the case, extremists arose who professed to believe that drugs have no power over disease, and all that was necessary was to leave everything to Nature,—the so called Vienna school of therapeutic nihilists, whose favorite motto was *Medicus Naturæ minister non magister est.*

In this country Boston claims the honor of being the birthplace of the reformation in medicine. Our New England brethren are fond of dating a new order of medical ideas from the publication of an address by Dr. Jacob Bigelow, "On Self-Limited Diseases," in 1835.

Before proceeding any further, I wish to disclaim any attempt at belittling the importance of this discovery *per se*. It is the evil results that it has led to that I deplore, and which, I think, should be remedied, and I will now endeavor to give the reasons for the faith that is in me.

A witty Frenchman once said that cases of disease to be truly satisfactory must end fatally, because autopsies are essential in order to verify the diagnosis. This heartless jest would serve me well for a text if I were able to do justice to the theme.

A few years ago diagnosis was the all-absorbing subject at a medical clinic; the

* An address delivered before the Ulster County Medical Society by the retiring president, June 2, 1891.

treatment was usually summed up in a few words. The average student would esteem it a far greater honor to be able to verify his diagnosis by an autopsy than to cure his patient with medicine. The one was capable of demonstration, therefore scientific; the other was open to doubt,—that is, so far as the relation of cause and effect was concerned,—and therefore empirical.

Many of our standard works on practice are open to the same criticism. Take "Flint's Practice," for example. This work has probably enjoyed the largest sale of any modern text-book in this country. While not assuming to pose as a critic of so able and accomplished a physician as the late Dr. Flint, yet I cannot forbear calling attention at this time to what I regard as an inherent weakness and serious defect in a text-book for students and young practitioners, and that is the nihilistic tone of his therapeutics. In a work of over one thousand pages there is not a single concrete prescription. While this would not have made the work any less desirable for the oldest practitioner, it would have been very much more useful for the younger reader. He rarely expresses a decided preference where several remedies are mentioned, and the young physician is left to his own judgment—which is often a minus quantity—to make a selection.

This constant contrasting of Nature with Art, to the disparagement of the latter, while made with the best intentions, has a bad effect on young practitioners. This iteration and reiteration that "there are no specifics," that "all diseases are self-limited, or, from the very nature of things, necessarily fatal," that "expectant treatment is the only scientific method," that "we must be very careful not to do any harm if we don't do any good,"—these admonitions, I say, constantly repeated by those who speak with authority, have the effect in time of making nihilists, therapeutic nihilists, of our young men. How can it be otherwise. A young practitioner, with little experience, reads in his journals of Sir William Gull and his mint-water treatment of acute rheumatism. Result, cure; or, at any rate, patient gets well in about the same length of time, it is claimed, as with rational treatment. Then he hears of a man in his own neighborhood cured of acute rheumatism by taking one ten-millionth of a drop of chamomile every four hours, in the short space of six weeks. He stops and thinks, and asks himself the question, Is medicine a science? Do drugs cure disease? And the next case of rheumatism he has he feels strongly tempted to invoke Nature and rely upon "expectant treatment." Bad luck to the patient. Lest the above may be thought flippant and exaggerated in tone, I submit the following quotation from Dr. Flint: "We hear now oftener of diseases managed with little or *no* medication than of cases illustrating the abuse of remedies."

While I am far from wishing to depreciate the importance of pathology or diagnosis, I earnestly desire to make a plea for therapeutics. As Oliver Wendell Holmes says, "The solemn scepticism of science has replaced the sneering doubts of witty philosophers. The more positive knowledge we gain, the more we incline to question all that has been received without absolute proof, . . . and some of those who have become medical infidels pass over to the mystic band of believers in the fancied miracles of homœopathy." If I may be allowed to indulge in metaphor, I would say that pathology is the Torch that lights the way, diagnosis is the Portal through which therapeutics, the Healer, may enter to relieve and restore. The prominent therapeutists of this country can be numbered on the fingers of one hand, while every medical college from the University of "Confederate X-Roads" to Harvard, advertises its special courses in physical diagnosis and pathological anatomy. The good old-fashioned method of reading medicine with a preceptor for a year or two before entering college offered about the only practical way of studying therapeutics. This is being gradually abandoned, to the great detriment of the medical student.

The recent graduate, owing to modern methods of teaching, is very apt to place diagnosis first, pathology second, and therapeutics third, since he has been taught to believe that Nature performs the cure in most cases, and he is content to be able to indicate the pathological condition and make a positive diagnosis. Whether admitted or not, this is a condition of affairs that exists to a degree that would surprise many clinicians were it possible to demonstrate its extent.

While I yield to no man in my admiration and respect for original investigators in etiology and pathology, I would like to ask, Which has been the greatest boon to mankind, the discovery of anæsthetics by Morton or the publication of his "Cellular Pathology" by Virchow? Contrast the benefits to the poor epileptic from the therapeutic application of the bromides to this fearful malady

with the pathological dissertations that have been written by the hundred on epilepsy. Have not antipyrin and phenacetin been of far more service to suffering humanity thus far than the announcement that the gonococcus is the etiological factor in the production of specific urethritis? Who would not prefer to be the discoverer of a specific for diphtheria than to be the one to absolutely demonstrate the microbe that causes it? While it is freely conceded that "therapeutic skill requires the practitioner to be a skilful diagnostician," yet a lack of faith in therapeutic measures will handicap the ablest diagnostician in his attempts to cure disease. While from a purely scientific point of view it is very pleasant to indulge in utopian visions of the future, when "medical practice shall become something higher in the estimation of the public than the administration of drugs, and the idea of the doctor will be less inseparably associated than heretofore with the lancet and the pill-box," yet as a matter of fact, until human nature shall be constituted very differently from what it now is, these dreams will not be realized. To state the matter plainly, when a man is sick and sends for a physician, he does so to obtain relief, and naturally expects his medical attendant to make some attempt at least to relieve him; in short, he expects him "to do something."

It is unnecessary to remind the members of this Society that it frequently happens that it is impossible to restore the patient to health, but it does not follow that he may not be made more comfortable. I hold that no form of sickness is ever encountered where something may not be done to render the patient less miserable; but where a practitioner sees only a pathological condition beyond the reach of remedies, or, on the other hand, discovers nothing abnormal by physical exploration, and dismisses the one as incurable and the other as requiring nothing further than "attention to hygiene," with the assurance that "nature will do the rest," he will be apt to find in a short time that his efforts are not appreciated.

Lionel S. Beale, the distinguished Professor of Practice at King's College, London, writes* as follows: "It must be admitted that in former days many doctors gave too much physic and were somewhat too fussy. In these days, however, I fear there is a tendency, or more than a tendency, to err in an opposite direction. Some practitioners, having convinced themselves, seem to be most anxious to convince the public and the profession that the chief duty of a medical adviser is to study, note, and carefully watch the progress of a malady; to observe, if he is qualified to do so, the minute changes taking place in the tissues of the sick man, in order that he may discover facts which will increase our knowledge of the nature of the pathological processes, and possibly lead to the enunciation of new principles of treatment for the benefit of sufferers in the next and succeeding generations. But this view of medical aspiration is not always appreciated by the patient, . . . and it will be found that there are some few patients so peculiar in their notions as to object to their bodies being used for observation, or their sufferings studied and noted as interesting pathological phenomena, which may be further elucidated as the case proceeds. You must really bear in mind that patients want to be relieved as well as watched, and unless you can be of some use to them, unless you can advise and help them, they may regard you as a nuisance, instead of discovering in you a consolation. . . . I have sometimes ventured to discuss with a medical friend the actual nature and import of the symptoms from which he was suffering, but I generally find that my friend is sadly disappointed if I do not propose to do something for him, or suggest some operation to relieve him."

Before bringing this brief and imperfect article to a close, I wish to correct any misapprehension as to my position. I believe in the *vis medicatrix naturæ*. I believe in the so-called self-limited character of many acute diseases, and that it is impossible to abort their course. Neither do I advocate the so-called "heroic" treatment; modern therapeutics is a vastly different thing from the drugging and dosing of a former age. The elegant and diminutive granule of aloin, containing one-eighth or one-fourth of a grain, is now substituted for the nauseous draught of elixir pro of a generation ago, and the hypodermic injection of morphine takes the place of the enema of starch-water and laudanum of our father's time.

Some sceptic may ask, What need of physicians if Nature can do so much and Art can do so little? I will answer this question in the language of H. C. Wood, who illustrates their use in acute complaints thus: "The captain of a fast-flying ocean steamer sees in the distance over the tranquil blue water a

* "Slight Ailments," p. 218.

small cloud the size of a man's hand, the mercury is falling in the barometer, and his practised eye tells him that a cyclone is approaching. He cannot escape that storm, he cannot stay its course, but he makes taut the ship, reefs the sails, and stands ready for the blow. So with the physician. His mission is to guide his patient's course through the dangers of his sickness. He studies the ways in which the disease approaches, the methods by which it kills, and the injuries which it is apt to leave. Typhoid fever kills by exhaustion, by high fever, by diarrhœa, by lack of digestive power due to extensive ulceration. Hence here are the danger-notes for the physician. At once he puts the typhoid patient to bed, to save that strength, the last grain of which may just be sufficient to hold together the bridge which is to carry the sick man over a yawning grave. He keeps the temperature down, within safe limits, for fever burns out the vital fires most quickly in this dread trouble. He secures rest at night for the sick man, to prevent the exhausting vigils in the long hours that follow midnight. In every way the leaks are stopped which are carrying off the life blood."

And now abideth pathology, diagnosis, therapeutics, these three; but the greatest of these is therapeutics.

129 CLINTON AVENUE.

BORIC ACID IN CHRONIC CONSTIPATION.

The cases suitable for this form of treatment, which has been recommended by FLATAU (*Berlin. Klin. Woch.*, No. 9, 1891), are those in which, on account of negligence or sedentary habits, a condition of habitual constipation is set up with its usual consequences in the lower bowels. Thus we have frequent hemorrhoids and catarrh of the rectum, while symptoms localized higher up, such as eructations, are met with,—a feeling of pressure or fulness, possibly ascribed to the stomach. The removal of constipation is often sufficient to lead to the disappearance of complaints from the side of the nervous system, such as depression of spirits, peevishness, and general grumbling, which are associated with a confined habit of body, and the explanation of which is not quite clear. While warmly praising treatment by massage, carried out by skilled hands, Flatau recommends in cases where there is a laxity of the rectal mucous membrane, causing part of it to be present at the anal opening, that it should be carefully washed with cold water and dried, after which powdered boric acid is well sprinkled over or rubbed in. In cases where there is torpor of the colon, and the mucous membrane cannot be treated in this way, the powder should be insufflated. This can be carried out by an insufflator with a short wide tube introduced into the rectum, and carrying about three fourths of a teaspoonful for use at one time. After the use of so simple a proceeding fairly well-marked peristaltic movements may be observed in the colon, and copious motions passed. Three or four evacuations daily have been passed during the first days of use. The patient should be encouraged to attend to all calls to stool, and avoid suppressing even the slightest indications of intestinal peristalsis.—*Medical Chronicle*, July, 1891.

A NEW METHOD OF DRESSING THE CHEST IN PNEUMONIA, PLEURISY, ETC.

DR. WILLIAM HUNT, of Philadelphia, advises the following dressing:

If there is to be any cupping or other preliminary operation, have that attended to; then all the ingredients wanting are pure collodion and absorbent cotton in smooth layers, and a good broad brush, like a mucilage brush.

Apply a very thin layer over the side affected, from spinal column to sternum, and secure it with collodion smeared thoroughly over it. Then go on with thicker layers, securing them with collodion, until a good padding is obtained, paying particular attention to the edges. In double cases you can act accordingly. The advantages are—

1. One dressing, if well applied, will last throughout the case.

2. Fatigue and discomfort of frequent poulticing are avoided.

3. The side in single cases is held as in a splint, while the free side does the breathing. A first-class non-conductor is covering the chest. It is quite probable that the contracting collodion may have some influence in controlling the blood-supply.

4. There is no particular interference, in one who has a good ear, with physical examination.—*International Journal of Surgery*, June, 1891.

The Therapeutic Gazette

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Leading Articles.

SOME NEW COMBINATIONS OF SOZOIODOL.

IN sozoiodol is found a combination of two drugs of the most marked activity,—iodine and carbolic acid,—together with sulphur. When first introduced in the treatment of skin-diseases it gave little satisfaction, on account of its irritating properties, but subsequently, when freed from its impurities, found to be most satisfactory as a parasiticide. It was found that this substance, whether employed in the form of pills or powders, as pointed out by Dr. Lassar (THERAPEUTIC GAZETTE, January, 1888), was well borne by the diseased skin, and a recommendation was given for its employment in combination with various other preparations, such as zinc, starch, vaseline, or lanolin. In parasitic hair-diseases it was especially efficacious when employed in a ten per cent. form. Other well-known iodine derivatives of carbolic acid, such as iodophenol, iodonaphthol, etc., on account of their intense iodine odor and irritating properties, have proved but little available for internal employment. The sulphonic acids of the phenol class, when presented in the form of iodine compounds, are, on the other hand, much more suitable for therapeutic employment, for, as is well known, carbosulphonic acid is a non-poisonous agent. Sozoiodol is then a derivative of this class, in which the sulphuric acid substitutes carbolic acid, and in which the iodine forms an entirely new atomic grouping. It contains more than fifty-two per cent. of iodine, and, instead of the poisonous power of the carbolic acid found in carbo-sulphonic acid to the amount of twenty per cent., it is non-poisonous and is equally antiseptic. Langaard, in 1888 (*Therapeutische Monatshefte*, September, 1888), found that sozoiodol, in two per cent. solution, is a free acid, which, as sozoiodolate of sodium, entirely prevented the development of micrococci, and was an active agent in the prevention of putrefaction. Since, as already stated, this compound seems to be free from all toxic properties, it is evident, then, that in this substance we have a valuable antiseptic agent. As to the element in this compound to which the antiseptic properties are attributable but little can yet be finally said, but this is a matter of little importance, provided its clinical value be established. Sozoiodol is completely odorless, and therefore much to be preferred on this account to iodoform, to which in other respects it is closely comparable. It is readily soluble in water and glycerin, does not decompose through the action of light, is readily combined with other remedial substances, and is capable of the widest application. Of the various combinations of sozoiodol with other bases, we would call attention among the metallic salts to combinations with zinc, lithium, and mercury, and sodium and potassium salts, as described in the *Pharmaceutische Post* for August 9, 1891, by Dr. Schwimmer. The author's experiments with the zinc compound of sozoiodol were mainly confined to the treatment of acute and chronic gonorrhœa. He employed in acute forms of gonorrhœa a half to one and a half solution of the sozoiodolate of zinc in distilled water with two and a half per cent. of laudanum; while in the chronic forms he substituted one per cent. of salicylate of bismuth for the laudanum, the percentage of the latter depending upon the irritability and degree of pain experienced. He states that in all cases of acute gonorrhœa where the inflammatory stage was commencing to decline,—that is, from the fifth to the seventh day of the disease,—he employed this injection three to four times daily,

and found that reduction in the secretion and in pain were rapidly produced, the effects being prompter and more satisfactory than followed any of the other zinc preparations. In the early stages he recommends the use of a one and a half per cent. solution. The sodium and potassium compounds of sozoiodol were employed either in the form of powder or of salves in various forms of syphilitic ulcers, in burns, ulcerated and contused wounds; also in the treatment of buboes after incision his results were more satisfactory with this preparation than with iodoform. He employed for this purpose the sozoiodol salt of sodium with five to ten times its weight of lycopodium powder, or in the form of an ointment, 10 parts each of lanolin and liquid paraffin to 2 of the double salt. The price of this remedy is said to be somewhat higher than that of iodoform, but yet its freedom from odor and apparently greater efficaciousness would seem to counterbalance this disadvantage.

In vesical affections Dr. Schwimmer employed a one per cent. solution for washing out this organ, and it seemed to be quite as efficacious in this mode of application as a three per cent. borax solution or a one per cent. resorcin solution. So also in ozæna, he states, its effects are satisfactory. The sodium salt when in solutions of moderate strength must be kept in the dark, since it is decomposed through the action of light, the iodine is liberated, and the solution acquires irritating powers. The mercurial salt, as would naturally be expected, was mainly employed in the treatment of various forms of syphilitic ulcers, 1 part of the mercury combination being mixed with 10 to 20 parts of powdered starch, or 1 part of the mercury salt with 20 of vaseline, to form an ointment. In twenty per cent. preparations the remedy is stated first to act as a tolerably severe irritant, so that the author advised that its employment be commenced with the use of a five per cent. preparation. Dr. Schwimmer is especially eulogistic of this preparation, and says that it exceeds in value any mercurial with which he is acquainted, even being suitable for subcutaneous injections, for which purpose he combines it with a small amount of potassium iodide. His cases in which he employed the mercurial salt as an antisyphilitic amounted to two hundred and thirty in number, and he maintains that in none of these cases were any of the difficulties or disadvantages which attend the subcutaneous use of other mercurials met with, and while its great solubility renders its subcutaneous employment free from the disadvantage, dangers, and drawbacks attendant upon the subcutaneous deposit of an insoluble material, its favorable effects are said to be quite equal to those of the least soluble mercurial preparations.

Dr. Schwimmer's experience, he states, has taught him that one injection each week is quite equal in its effect to three mercurial inunctions as ordinarily employed, and that, therefore, five to six injections correspond to about thirty days' constant employment of the inunction cure. Of course the subcutaneous injection of this, as of any other solution, must produce some slight pain; but the infiltration is extremely moderate, and in no case was sufficient to prevent the further continuation of the treatment. The injection was always made in the gluteal region, first in the right and then in the left side, employing doses of 1½ grains. The greater solubility of this preparation entails a correspondingly rapid absorption, and there is, therefore, a possibility of more or less tenderness of the gums, which may perhaps reach such a degree as to necessitate suspension of the treatment. This, however, may of course be largely prevented by ordinary precautions. In no case did he have any abscess formation, although, he writes, that he employed the remedy subcutaneously over twelve hundred times.

THE INSOMNIA OF CONTINUED FEVERS AND ITS TREATMENT.

IN typhus and typhoid fever, sleeplessness is a frequent, troublesome, and often dangerous symptom. Dr. Murchison, writing of the necessity of sleep in typhus, says, "The practitioner cannot be too forcibly impressed with the fact that loss of sleep at any stage of typhus, if it continue for two or three nights, is of itself sufficient to kill."

In typhoid the necessity of sleep is no less urgent. One of the first symptoms of approaching dissolution is a restlessness which forbids sleep, and the return of refreshing sleep is hailed by physician and attendants as a presage of recovery.

In the earlier stages of these fevers, insomnia is pretty certain to accompany the hyperthermia, while sleep often attends a fall in the temperature. It would seem that overheated blood is itself inimical to sleep by exciting the cerebrum. Certain it is that cold bathing—the cold or tepid bath—and antipyretics that bring down the fever quiet th

nervous disturbances and promote sleep. Hence, for the restlessness and insomnia of typhus and typhoid fevers, there is often no better treatment than a cold bath of about fifteen minutes' duration, the temperature of the water being from 60° to 75° F., and during the bath cold water may be poured on the head in cases of extreme pyrexia with restlessness and delirium. While fifteen minutes ought to be long enough to depress the febrile heat to nearly the normal, in some cases the bath may be of longer duration. "The earlier the stage, the higher the fever, the more robust the constitution, the colder should the water be. The later the stage, the weaker the constitution, the more affected the nervous system, the warmer should be the water."*

Some writers claim to have found cold sponging and the wet-pack a sufficient substitute for the cold bath. Others have derived only a temporary refreshing from these milder means.

Where the cold bath is impracticable, from difficulties on the part of the patient or his surroundings, some one of the new antipyretics may be tried. There is much testimony in favor of acetanilid as a nervous sedative in fevers. 5 grains every hour for three or four doses (in an adult) will generally lower the febrile temperature two or three degrees, and one or two hours of quiet sleep (especially if the medicine be given in the night-time) is almost certain to follow. By many practitioners and hospital physicians, antipyrin is regarded as the preferable hypnotic; the dose should be double that of acetanilid.

These antipyretics, though they undoubtedly have a marked action on the thermogenetic and thermotaxic heat-centres, which are under abnormal irritation by the fever-poison, an action which is extended to the higher cerebral centres, certainly do not affect the infectious agent, and hence the course of the fever is not influenced by them. Their prolonged use is probably attended by some cardiac depression (an evil to be especially shunned in fevers), and the best clinical authorities are shy of them, seeing no permanent advantage in the continued administration of these medicaments, but possible mischief. At the most, their employment is restricted to the obtention of such sedation as is needed for the nervous disturbances.

Among the pure hypnotics, chloral still deservedly takes the lead in the treatment of the insomnia of fevers. It calms the delirium, saves the forces, moderates the fever, and produces a sleep strikingly like natural sleep in its refreshing effects (Liebreich, Nothnagel, Flint, Russell, Dujardin-Beaumetz). The only contraindication is cardiac weakness. In the later stages of typhus and typhoid it is better to avoid chloral, substituting opium or morphine, and in the earlier stages, where there is much jactitation and delirium, and especially when diarrhœa is a prominent symptom, 20 drops at bedtime of the deodorized tincture of opium in a little camphor-water is a useful adjunct to other measures intended to subdue restlessness and produce sleep.

With regard to sulphonal, we think that experience has proved this hypnotic to be of little utility in the obstinate insomnia of fevers, and the same may be said of chloralamid and other of the more recent hypnotics. Paraldehyde, were the taste not so objectionable, might render considerable service in the delirious insomnia of typhus.

Alcoholic stimulants judiciously administered sustain the heart and circulation, promote the nutrition and restoration of the nervous system, and thus come under the head of remedies useful to combat insomnia. Given in too large or too frequent doses, they undoubtedly defeat the end for which they are given, and aggravate existing nervous disturbances. There is another reservation,—they must be cautiously prescribed where there is renal insufficiency.

Stokes, in his lectures, speaks of the well-marked calming and sedative effect of wine in fever. "A patient who has been restless, sleepless, and delirious will sometimes become quiet and fall asleep after the administration of a little wine. This occurs where the nervous symptoms are probably due to an anæmic or spanæmic condition of the brain associated with a weak heart and a flagging circulation."†

Febrile insomnia is essentially a toxic insomnia; this has been made apparent by the investigations of the last few years. Whether it be the microbes or their ptomaïnes, or both, which excite the cerebrum and derange the nervous functions, has not been yet positively determined. Uræmia probably enters as an important factor; in the active stages of fevers, and in the declining stages when the circulation is oppressed and languid, and

* J. C. Wilson.

† "Lectures on Fever," Lea Brothers & Co., 1876.

the prognosis is grave, elimination by the kidneys is always imperfect. Hence an important part of the treatment should be to promote the excretion of the poison and the removal of effete matters. Unfortunately, this indication can be but imperfectly met. All that can be done is by suitable nutrients and stimulants to sustain the organic forces in their struggle with the foe, and to favor elimination by the kidneys and other emunctories. The various diluents (lemonade, barley-water, effervescent drinks, plain water, etc.) which are so freely given, because so constantly craved, promote excretion by the kidneys. Milk is often prescribed *ad libitum* as the sole drink and nourishment; its diuretic properties are well known. Some clinical authorities are in the habit of ordering mild diuretic mixtures (solutions of nitrate of potassium, of sweet spirits of nitre, with sometimes the addition for several successive days of a little digitalis) all through the fever, and claim good results.

The bowels should be kept open, suitable mild laxatives being given if there be constipation, and frequent cold or tepid ablutions, followed by brisk rubbing, will do something towards promoting the functions of the skin.

We have hinted at anæmia and spanæmia as being part causes of the insomnia of continued fevers. Emphasize as we may the poisoned condition of the blood and the abnormities of the circulation, the fundamental factor in the insomnia, headache, jactitation, delirium, and hebetude of continued fever is malnutrition of the highest nerve-centres, and against this our therapeutic resources are meagre. The necessity of nourishment is apparent; but little food, however, can be assimilated; and, in the absence of any specific medication (for which the profession is looking), the best that can be done is judiciously to combat dangerous symptoms. The insomnia is the measure of the cerebral disturbance, and, if this can be successfully overcome, one important obstacle at least in the way of recovery is removed.

Reports on Therapeutic Progress.

PROFESSOR LANNELONGUE'S TREATMENT OF TUBERCULOSIS.

Undoubtedly, since the reading of Professor Koch's celebrated paper at the last meeting of the International Medical Congress in Berlin, the most important contribution to the study of the treatment of tubercular disease was that made by PROFESSOR LANNELONGUE to the Academy of Sciences and to the Academy of Medicine. The reading of the paper had been looked forward to for some time, as it was noised abroad that M. Lannelongue was actively engaged in confirming a series of encouraging observations which had led to some very remarkable results. Consequently the lecture-hall of the Academy was filled by a distinguished scientific and appreciative audience, which listened attentively while the author, calmly and clearly, and with admirable scientific reserve, made his some-time-anticipated communication. According to the Paris correspondent of the *Lancet* (July 11), who reports this lecture in detail, he began by saying that it was now four months since he made the first trial of his method of combating tubercular mischief in the human subject, and that during this time he had applied it to examples of the various stages of tubercular evolutions, from the earliest to the most advanced forms. The results obtained and controlled by the most careful observations appeared to him worthy of being made public without further delay, in order that they might be submitted to the test and judgment of all. And this for two reasons,—first, because of the urgent importance of the subject itself; and, secondly, because the simplicity of the method, as well as its prompt action, will enable every practitioner to appreciate its value. Moreover, it is not a question of a specific remedy, acting directly on and destroying the bacillus, but of a well-known chemical and antiseptic agent, applied in a method the details of which are to follow,—viz., chloride of zinc.

The lesion produced by the bacillus of tubercle being nearly always localized to one place in the organism, it seems reasonable to suppose that the best results would be obtained from remedies applied to the affected area, and that nature's work of repair would be imitated in every respect if one could bring about a transformation into fibrous tissue—a tissue representing cicatrization, or the natural reparative processes—of the morbid elements which are mostly destined to degenerate, and to become, in the great majority of cases, foci of infection, first for the neighboring parts, next for those more remote, and finally for the whole economy. In brief, the object aimed at by the method is to bring about a sclerosis of the tubercular tissue wherever may be its seat. In effecting this, a condition is brought about which is in-

compatible with the existence of the bacillus, since this latter is found to disappear, or at least to become powerless for evil, when the condition in question is established. The method itself consists simply in conveying the appropriate therapeutic agent, not into the fungous growths, nor into the actual tubercular foci, but outside and around them only. The anatomical structure and the manner of increase of these foci show the advantage of this precaution; for while at the periphery are found in full activity the most recent processes, in the centre there is nothing but degenerated products, which goes to show that the bacillary action always spreads eccentrically, and that the normal tissues forming the limit of the morbid centre are as a matrix continually elaborating under bacillary stimulus these tubercular neoplasms, which then propagate and spread, invading all before them. Hence the necessity for modifying as early as possible the peripheral tissues, as well as for attempting to alter the area already invaded, where the bacillus is in full activity; for it must not be forgotten that the latter zone is dependent for its blood-supply —in other words, for its nutrition—on the peripheral zone.

Now, experiments have shown that chloride of zinc produces a remarkable fibroid change in the normal tissues of animals, and, as might be expected, the same fibroid transformation is brought about by the same agent in morbid tissues in general, including the tubercular. This chemical compound may be said to fix the anatomical elements by killing them, for it obliterates the capillaries and smaller vessels around where it has been deposited. An inflammatory action is thus set up in the vascular walls, which narrows the calibre of the surrounding vessels for a considerable distance from the initial point. But over and above this another local change of the highest import is brought about. Very rapidly—even within a few hours—there is produced in the altered tissues, by transmigration, and probably also by cell proliferation, an enormous afflux of new anatomical elements. These young cells cause fresh œdema of the periphery of the granulation growths, and infiltrate the tubercular neoplasm to the fullest extent. From this moment the struggle sets in between the accumulated elements and the bacilli, especially between the migratory cells and the microbes, to the detriment of the latter. However it may be as to the strife between cell and bacillus, the elements of the morbid growth which the chloride of zinc had destroyed are reabsorbed slowly, and finally disappear. The young cells, on the contrary, organize with great activity, and form a firm fibrous tissue, which is met with in appreciable quantity as early as the day next after the injection.

Following the sclerosis in articular fungosities, there is produced a thickening and subsequent condensation of osseous tissue if the periosteum be involved in the reparative process, as was the case in the examples of osteo-arthritic disease cited by the author. The remote results, so far as it is yet possible to judge, show a marked tendency for the sclerosed elements to be replaced by a more pliable connective tissue. As a consequence, the diseased parts regain their suppleness and their form, while locomotor functions are preserved entirely, or at least to the limits present at the beginning of the treatment. So far twenty-two patients had submitted to the treatment, including two cases of pulmonary tuberculosis. As to these latter, however, nothing could yet be said, for the injections were begun on June 23 only. The other twenty were all cases of surgical tuberculosis, which M. Lannelongue classifies into—first, *non-suppurating and not open*, eleven cases, including six cases of tubercular knee-joint disease. Of these six cases, two have been up and about for a month past. They walk with all the functions and even the form of the joint well preserved. Another treated more recently is getting up. Of the remaining three, one is about to walk, the other two being under treatment since June 13 only, but they are progressing satisfactorily. An elbow-joint case and an ankle-joint case are both cured, the former preserving all the natural movements. His second group, *suppurating and not open*, consists of seven cases, including four joint cases, two of the knee, which are almost cured, and two of the ankle, doing well. The third group, *suppurating and open*, consists of two cases of advanced and suppurating osteo-arthritis of the ankle-joint, in one of which it was a question of amputation, but both are now doing well. Such, continued M. Lannelongue, being the results accruing from a somewhat limited operation, the question of permanent cure presents itself. Taking the cases of knee-joint disease for example, may not they be considered cured who have regained the complete functions and even the form of their joints, who feel nothing abnormal, who walk all day, are gaining in strength and weight, and who, in short, for more than a month past

have led their ordinary lives? But notwithstanding all these facts and appearances, one cannot be too cautious in coming to a conclusion.

Permanent cure involves the undoubted disappearance of the bacillus; but this disappearance M. Lannelongue was not absolutely able to affirm. It is true that in a tuberculous specimen which was taken from one of the patients after the sclerotic change had been induced, no trace of a bacillus could be detected, and that a guinea-pig which was inoculated with a preparation from this same specimen two months ago is still alive and well. There was still in some of his cases the question of wrong diagnosis, and he was willing rather to accept the responsibility of an inexact diagnosis than to advance too fast. But however this might be, there was every reason to believe that the transformation of tubercular tissue into fibrous tissue was little compatible with the life of a bacillus, and there could be no manner of doubt that among some of his patients the bacillus of tubercle showed for nearly three months no evidence of its presence. The constitution of the new tissue would in any case lessen the chances of general infection, for it has for a long while been recognized that tubercular foci which are softened and full of liquid are much more dangerous, not only to the neighboring parts, but to the entire economy. If, then, the bacillus persists in the sclerosed tissues, a point which M. Lannelongue was trying to resolve experimentally while waiting the proofs to be drawn from the examination of further microscopic preparations, it would appear to be confined in an encapsuled and therefore harmless condition, all traces of its activity having disappeared for a time, the length of which was increasing day by day. The near future would, however, alone definitely settle this point.

In commenting editorially on the above communication, the *Lancet*, on July 18, especially calls attention to the fact that the treatment of tubercular diseases brought under the notice of the Paris Academy by M. Lannelongue, is essentially based on the simple fact that fibrous induration is to be regarded as the natural curative process of tubercular change. It having been found that chloride of zinc is peculiarly apt to excite such sclerotic processes, when administered in sufficiently small quantity (2 or 3 drops of a ten per cent. solution) so as to obviate its more powerful escharotic action, this substance has been employed, and has yielded very satisfactory results in external tuberculosis, and its application in the case of pulmonary tubercle is, according to M. Lannelongue, equally encouraging. As an illustration of the changes effected by injections of this salt into tubercular tissues may be cited the case of a child suffering from caseous glands, many of which had become fused into one mass. These were treated by the injections, and after a few days, suppuration commencing, the glands were extirpated. Opportunity was thus afforded for comparing histologically those glands which had been injected and those which had been left alone. In each case there was caseous material surrounded by a zone of tubercular tissue within a fibrous sheath; but in the former glands the whole substance was dense and fibrous, and very firmly adherent to the investing layer. It would appear that the tubercular formation itself is less influenced by the agent (which has no specific property, and is therefore not in the least comparable to Professor Koch's tuberculin) than are the healthy tissues that surround the tubercles. The aim of M. Lannelongue's method is, then, to induce the formation of a densely fibrous investment to active tubercle, and by this process of encapsulation to limit the diseased product, and as it were to imprison the bacilli.

That chloride of zinc does possess the property claimed for it, is sufficiently proved by the experimental study conducted by M. Lannelongue, in conjunction with M. Achard; but the adoption of his treatment will depend upon the confirmation of his results at the hands of others. We confess that, while recognizing its possible utility in tubercular joint-disease and glandular affection,—in some cases as a curative agent, in others as a useful adjunct to further surgical proceedings,—we must speak with the greatest reserve upon its application to internal tuberculosis, and especially to cases of pulmonary phthisis. M. Lannelongue gives notes of two cases of commencing pulmonary tuberculosis, both in children, in which a single injection of 2 drops of a 1 in 40 solution was made into the apex of the affected lung (through the second intercostal space). In each case râles previously present disappeared after the injection, and in one case the temperature remained normal, in the other it rose slightly on the fourth and fifth days; but these cases are by no means conclusive, and it is impossible to base any definite opinion upon them. Indeed, on the whole subject of the curative effect of the method, M. Lannelongue sp

with commendable reserve; and although M. Le Fort claims a priority in the treatment of articular tubercle on the same lines,—having in 1879 employed injection of sulphate of zinc for this purpose, with results which at first were encouraging, though later there was recurrence of the disease,—there are differences in the methods employed in the two instances; and it may well be that the new procedure may be found to be of more considerable utility. It has one great merit, that of simplicity, and it deals with a substance the composition of which is no mystery.

THE INCUBATION PERIOD AND ITS SIGNIFICANCE.

In considering the nature of the so-called specific infective disease, as revealed by the light of modern research, it is impossible not to be struck by the great limitations that are placed on all our efforts to strike at their root, other than by way of prevention. Nevertheless, it must be apparent to the least reflective, that if medicine is to advance in the art of therapeutics, it should seek continually not only to prevent disease, but to counteract its effects when it has gained possession of the organism. In the case of the specific diseases, which may now be assumed to be due to the entrance into the body from without of some virus, an assumption warranted by the proved facts of bacteriological research, we are confronted with the problem how we can assist to the best advantage in the expulsion of the morbific agents, or in the neutralization of their action. Hitherto we have not been in a position to say that anything more can be done than to render such support to the vital forces as will enable the blood and tissues to successfully resist the noxious operations of the poisonous agencies. For in spite of all that has been written of the value of antiseptics, their application in internal medication is singularly, though not surprisingly, inadequate. Indeed, it can hardly be expected that any drug can be administered with safety which can influence the operation of a subtle and widely-diffused virus, which, though varying in intensity, produces its effects on all parts and organs. For a time the human body becomes one vast culture-ground for the growth of foreign organisms, and the issue of the case depends on many factors, such as the suitability of the soil, the intensity of the generated poisons, and the power of resistance inherent in the individual tissues.

In a recent article M. CUFFER (*Rev. de Méd.*, June, 1891) suggestively points out that our hope of really and effectively treating these diseases by specific measures must largely rest upon the ability to recognize them in their earliest stage. This stage is, he maintains, the so-called incubation period, for he holds it to be erroneous and inexact to exclude it from our conception of the disease as a whole. That which is commonly called the "invasion" of a disease is really nothing more than the overt manifestation of the operation of a virus that may have been already working its baneful influence for hours or days or even weeks before that time. Applicable as this reasoning is to the acute infective disorders, it is even more so to such an affection as tuberculosis, in which there is every reason to believe, from both the teachings of clinical experience and those of laboratory experiment, that a considerable interval of time must elapse between the actual invasion of the bacillus and the formation of "tubercles" and the overt signs of tuberculosis. He would term this latent period the "pregranulic" stage, but it would be quite as accurate to call it "pretuberculous." It is suggested from the analogy afforded by Pasteur's results in hydrophobia that the subjects of tuberculous infection may possibly be successfully treated in this the first period of infection, when but little can be hoped from any other measures, even by the application of some such method as that of Professor Koch, to counteract the ravages of the declared disease. Indeed, the general experience of Professor Koch's treatment by tuberculin has been to show that it is only possible to effect any marked amelioration in the symptoms when cases are treated at the earliest period; and *a fortiori* it might be hoped that, if means could be afforded for the recognition of tuberculous infection before any manifest signs of tuberculosis appeared, a possible means of checking their development might be afforded. As regards tuberculosis, M. Cuffer considers that we have at least two clinical indications of the bacillary invasion. These are *fever* and *anæmia*. Often, he says, long before any manifest signs of tuberculosis, before any cough or other functional derangement occurs, there will be complaint of malaise and a degree of pyrexia which may even lead to a suspicion of typhoid fever; and he compares the slighter evidences of tuberculous infection with those rarer and intensely rapid cases of generalized tuberculosis which are marked by high fever from the

onset to the fatal termination. There is nothing improbable in the notion that the invasion of the bacilli of tubercle is first evidenced by the occurrence of fever; but, regarded from the practical point of view, and in view of the admitted difficulty of the recognition of developed tuberculosis in its early stages, it is hard to see how such a conception will aid us much in any line of treatment. To fever he allies the development of anæmia, which, he considers, has a direct relation to the growth of the bacilli, and he further declares that this is associated with enlargement of the spleen, which can be perfectly well recognized. His application of these considerations to practice is based on the doctrine that, in order to combat bacillary invasion, the soil must be modified, and one great element in this is to maintain the healthy nutrition of the body.

From the very first, then, he counsels the adoption of restorative measures, good and sufficient food, and the care of the digestive organs. Since the febrile symptoms are the index of the presence of the microbes in the body, it is useless to rest content with febrifuge remedies. The treatment must be directed against the microbes themselves, and not against the disturbances of which they are the source. Now, since there is reason to believe that the anæmia is due to the directly destructive action on the blood-corpuscles of the bacilli which live at the expense of the oxygen in the corpuscles, M. Cuffer thinks that in gallic acid there is a remedy which from its affinity for oxygen will indirectly operate as a "microbicide." For such a remedy will so modify the soil as to render it inappropriate for the sustenance of the bacilli. It will prevent their growth, and it will do so without exerting any injurious effect on the body itself. But tannin and gallic acid by their astringency may also further prevent the tendency to vascular congestion, which is such a favoring cause of dissemination of tubercle. The adoption of such remedies (with which antipyrin may be combined) is, however, limited to the "pregranulic" period, and that being so, we fear that it may be long before they can be generally appreciated. Nevertheless, we do not deem M. Cuffer's theoretical reasonings as matters to be lightly dismissed. They are in perfect accord with the etiological facts so far gleaned as to tuberculosis, and where they fail is not so much in the existence of flaws in argument as in the intrinsic and almost insurmountable difficulties of the subject. It is, as we have often said, extremely difficult to diagnosticate a developed tuberculosis. It is infinitely more difficult to be sure of the diagnosis of bacillary infection; and yet this is the unknown land to which the steps of future investigators must be directed until it has been thoroughly explored.—*Lancet*, July 4, 1891.

THE TREATMENT OF BROMISM.

FÉRÉ some time ago advised intestinal antisepsis in endeavoring to counteract the unpleasant effects of the long-continued use of the bromides. According to the *Bollettino della Poliambulanza di Milano* he has recently made a second communication on the subject. He employs β-naphthol combined with salicylate of bismuth. Sixty grains of the former and thirty grains of the latter drug are given daily. Thanks to this antisepsis, he is enabled not only to continue the use of the bromides, but to increase the dose up to two hundred and even two hundred and fifty grains a day. The treatment is especially effective in causing the disappearance of the cutaneous manifestations of bromism. Since borax has come into use in the treatment of epilepsy, Féré has noticed that it also often caused unpleasant disturbances of the skin. He has, therefore, employed the same method of intestinal antisepsis, and found it equally successful. He suggests that further experimentation may show that intestinal antisepsis will permit of the employment of many other drugs which at present are not well borne by the system.—*New York Medical Journal*, August 1, 1891.

TREATMENT OF TYPHOID FEVER.

DR. TORDEUS has been employing with considerable success a treatment for typhoid fever in the St. Pierre Hospital, Brussels, which consists essentially of moderate doses of an antipyretic combined with an antiseptic. Thus ten grains of acetanilide and an equal quantity of resorcin, or about half that amount of thymic acid, are made up into a five-ounce mixture with a compound decoction of aloes, and tablespoonful doses administered every three hours. This was found to exert a remarkably beneficial effect not only on the temperature, but also on the general condition of the patients. From trials made with acetanilide alone, it was evident that the antipyretic effect was almost entirely due to the combination with it of the resorcin on t

thymic acid. Several children were included among the patients so treated; the doses given being of course proportionately smaller. Dr. Tordeus is of opinion that treatment of a similar description will be found suitable in other zymotic diseases; indeed, he has tried a combination of acetanilide and benzoic acid in measles and in croupous pneumonia, the latter drug being selected in preference to resorcin on account of its possessing expectorant as well as antiseptic properties.—*Lancet*, August 1, 1891.

A NEW METHOD OF PRODUCING LOCAL ANÆSTHESIA.

Dr. Wiesendenger describes in the *Journal für Zahnheilkunde* a new method of producing anæsthesia by the application of cold, the characteristic feature of which is that it is not the cold-producing agent which touches the desired part, but a metallic tube or chamber which is cooled by carbonic acid. The cold may, according to the requirements of the case, be regulated from the temperature of cold water to one sufficiently low to cauterize. The first symptom of this artificial cold is anæmia of the cellular tissue, producing a slight sensation of burning, which is followed by anæsthesia, which lasts from one to two minutes and then disappears without any ill effects. As the instrument may be manufactured of almost any shape, it is evident that this new method may be used for a variety of purposes. The simple turning of a tap will regulate the stream of carbonic acid to any degree of temperature down to 4° F. No moisture is produced. In using this cold for the purpose of cauterizing, the surgeon has the advantage of producing anæsthesia at the same time. When applying it to any of the internal cavities, such as the mouth, it is necessary to have the parts carefully dried, as the tissues would otherwise adhere to the instrument. Dr. Kummel applied the method in the case of a boy in the Maria Hospital at Hamburg with such complete success that the boy looked on without moving a muscle while a deep incision of twelve centimetres in length was made in his thigh. Other gases which can be brought into a fluid state may be used in place of carbonic acid. The carbonic acid which has been used for the purposes of anæsthesia may be led into a vessel which has been tested to a pressure of three atmospheres, and is provided with a manometer and safety-valve, whence it could be used as a motor agent or for preserving food. An iron bottle of fluid carbonic acid at a pressure of fifty atmospheres is sufficient for fifty operations. This can be bought for four or five shillings. The instrument for the application of cold to the tissues costs thirty shillings.—*Lancet*, August 1, 1891.

THE ABORTIVE TREATMENT OF ERYSIPELAS.

Dr. Natale Amici's method consists in sterilizing the streptococcus of erysipelas in the shortest time possible. Infection is not always limited to the reddened portion of the skin, but is often found beyond this in the latent state, even at the distance of thirty-five to forty centimetres, as the author has been able to undoubtedly prove in erysipelas of the extremities. It is not always easy to decide whether the infection be limited to the reddened skin alone, as is especially the case when the disease is met with at its beginning, or is beyond the boundaries of the inflamed spot. In general one may suspect that the infection has overleaped the apparent limits, if from the first there be symptoms of any gravity, as high fever, headache, burning thirst, and vomiting. Besides these phenomena in such cases, the apparently normal skin will be found on pressure to be painful, which pain will be more striking if pressure be made upon the inflamed focus. In other cases isolated inflamed spots, of the size of a franc-piece, will be discovered scattered here and there on the surface of the normal skin; these are also sensitive to pressure and already foci of infection. As one withdraws from the central infected and inflamed spot the cutaneous painfulness on pressure decreases gradually until where it ceases one may assume that healthy skin is reached. Hence, if one would stay the progress of the disease, these outrunning points of infection must be sterilized. Therefore this method of abortive treatment consists in carefully recognizing latent infection in order to combat it as quickly as possible. Any suitable antiseptic may be used. The writer employed solutions of carbolic acid and alcohol, carbolic acid and glycerin in equal parts, and, finally, in those cases where this remedy is not well borne, he recommends the following:

Hydrarg. chlor. corrosiv., .03 gramme;
Glycerin, 30 grammes.
For external use.

All these three solutions are to be applied locally by means of a small brush. This

same treatment is also useful in lymphangitis. —*Journal of Cutaneous and Genito-Urinary Diseases*, August, 1891.

SULPHOICHTHYOLATE OF AMMONIUM IN GONORRHŒA.

DR. KOSTER states that he has obtained most remarkable success in the treatment of four cases of gonorrhœa, three of which occurred in men, and one case of gonorrhœal cystitis in a woman, by a solution of a one per cent. solution of sulphoichthyolate of ammonium. In the men, he ordered urethral injections, repeated three times daily, and there was almost immediate disappearance of pain on micturition and of the painful nocturnal erections, with complete cessation of the discharge in from eight to twenty days. In the case occurring in the woman he ordered this solution injected twice daily into the bladder, to remain there for about five minutes. The pain was rapidly relieved, and the abundant deposit of muco-purulent sediment in the urine disappeared after the third day, with complete cure in two weeks.—*Journal de Médecine de Paris*, June 14, 1891.

INSOMNIA OF GASTRO-INTESTINAL ORIGIN.

Writers have dwelt much on the cerebral hyperæmia attending disordered states of the stomach. That indigestion causes insomnia by exciting the cerebrum is a matter of common experience. With many persons even the active exercise of digestion, if this be at all difficult, is incompatible with sound sleep. Such individuals refrain from lunching or partaking of a hearty meal before going to bed. Certain valetudinarians cannot drink a glass of milk or eat a biscuit late in the evening without atoning for the indiscretion by hours of sleeplessness.

Such inhibition of the cerebrum by the stomach is of frequent experience in the nursery. The first thing the physician thinks of when consulted with reference to insomnia in a young child is the probability of indigestion as the main factor in the case. What is the quality of the food, what about the quantity, and what is the condition of the digestive organs? Attention to these points, in the absence of objective signs of importance as fever, will generally put one on the track of the cause and suggest the remedy.

The indigestion may be functional or organic, and all pathological conditions of the stomach are likely to be accompanied by insomnia. Structural diseases, as gastritis, ulcer, gastrectasis, cancer, cause sleeplessness, both by the pain and discomfort, and the consequences of indigestion which attend them. One of the most frequent symptoms of indigestion is flatulence. The stomach, by failure of the normal peptonization process, is inflated and oppressed by the gases of decomposition; the distended stomach presses on the thoracic organs, embarrassing the heart and causing troublesome palpitations. Toxic products are often formed by the malelaboration of peptones; these irritate the nervous centres and render the cerebrum hyperæmic.

But there is another aspect of the question. In persons with healthy stomachs and normal arterial tone, the digestive process is not prejudicial to sleep. Somnolence, in fact, often attends digestion, especially after a hearty meal. This has been attributed to flushing of the stomach, at the expense of cerebrum, which is a necessary condition of its function. Digestion normally occurs without attracting the consciousness, and there is no reason why, on proper occasions, sleep should not follow a hearty meal in men as well as in carnivorous animals. It is not true that during sleep the digestive functions are practically suspended, as some authorities have said: "During sleep the medullary centres relax their activity, digestive fluids are not secreted, and the movements of the gastro-intestinal canal almost, if not entirely, cease." It is surprising to meet with an error of this kind in a writer ordinarily so accurate as MacFarlane. The stomach and intestines continue their function during sleep, though with lessened activity; the secretions are not suspended, the unstriped muscular fibre continues a constant though diminished action; the spinal cord even seems preternaturally active, the inhibiting restraint of the cerebrum being withdrawn. In reality, in sleep all the essential functions continue to be exercised. Those most indispensable to life—circulation, respiration, digestion, etc.—are performed as during the waking period, though more sluggishly. Thus, the heart beats more slowly during sleep. "*Pulsus in somno parvi, languidi rari*," says Galen. With the retardation of the circulation, there is diminished activity of the secreting glands (gastric, intestinal, pancreatic, etc.), but in healthy persons these organs are adequate to the work imposed upon them, as is proved by the fa

that multitudes can eat a full meal on going to bed, sleep soundly, and be ready for another meal on awaking. Nor can it be said that the peristalsis of the gastro-intestinal canal ceases during sleep, any more than the contraction of other unstriped muscles (the arterioles, for instance), which are not under the will.

Germain Sée, who refers most cases of digestive insomnia to difficulties attending the secondary or intestinal digestion (and here he is seconded by MacFarlane), thus defines this kind of insomnia: "Intestinal digestion generally begins three hours after a meal and ends in seven or eight hours. The patient, we will suppose, sups at 6 P.M. At ten o'clock he goes to bed, but cannot sleep till long after midnight. This is the time when the pancreatic-intestinal digestion is going on; when this is finished, the patient goes to sleep.

"To prove that I am right as to the cause of the insomnia, let the patient eat a light supper at the usual time, or let him sup at four o'clock in the afternoon, and he will find that he will go to sleep at the proper time."

In the treatment of insomnia from indigestion, the quantity and quality of the food must be taken into account, the condition of the stomach, intestines, and the auxiliary organs.

1. Errors are most frequently committed as to quantity. The digestive organs may be competent to dispose of a certain bulk without pain or difficulty, while an excess causes embarrassment to the stomach; decomposition and flatulence set in under unmolested microbic rule; putrid and more or less toxic gases and ptomaïnes are generated, and a "bilious" condition supervenes, such as every one has experienced at times. It is, doubtless, true that while multitudes are underfed, more persons are injured by excessive eating than by a spare diet. Insomnia naturally comes in as one of the consequences of overeating and overdrinking, for a burdened stomach will not let the brain rest.

The proper remedy for sleeplessness arising from this cause is apparent,—it is to curtail the daily rations to the physiological standard. The necessity of eating slowly and deliberately with thorough mastication of the food is apparent; those that "bolt" their food are sure to eat to excess.

2. Food of poor or insufficient quality produces anæmia and starvation of vital organs, including the cerebrum, and hence engenders insomnia. Physicians cannot too much insist on the necessity of a full diet,—that is, of an adequate admixture in the daily fare of albuminoids, fats, and carbohydrates. Food of indigestible quality produces essentially the same evils as excessive alimentation. Under this head may be included food improperly or insufficiently cooked (good cookery under our civilization has become indispensable to healthy digestion), and foods that most persons of sedentary habits find hard to digest, as unripe fruit, pastries, hot bread, fried pork, confectionery. Of course, butcher's meats should be selected that are tender and juicy, and in the light of recent discoveries (Gautier, Selmi, etc.), it is doubtful if meat or game that has become high (*faisandé*) is fit for food.

Foods of themselves sufficiently digestible may become indigestible if too many kinds are eaten at a meal. But this brings us again to the evils of excessive eating.

It need not be repeated that he who would sleep well must avoid those articles of diet which have been found to be indigestible, or should indulge in them sparingly. Much depends, of course, on the muscular work done. Horace speaks of the *dura ilia messorum*. The hay-makers on the salt marshes need food hard of digestion,—that is, food that is *slowly* digested, yielding up force for many hours; food that in common parlance "stays by," such as baked beans and pork, boiled beef and cabbage, and mince pie. Such persons sleep well, despite their hearty fare; it is especially the "brain-workers," the men of sedentary habits, that are upset by a rich diet.

3. A healthy digestion presupposes a healthy state of the stomach, intestines, and accessory organs, and any derangement of these viscera must be corrected by suitable medicinal and dietetic means before normal sleep can be enjoyed.

To enter on a consideration of all these derangements would take more space than we have at our command. The hygienic treatment of indigestion includes dieting, exercise, recreation, cold bathing, etc. The cold shower-bath in the morning is sometimes a powerful aid to digestion. Exercise promotes a more vigorous circulation, and favors peristalsis and chymification; equally necessary are change of scene, diversions, and the cultivation of a contented, cheerful frame of mind.

Among the medicinal means are—

1. Such as favor gastric digestion,—namely,

alkalies before meals, and acids with pepsin after. Clinical experience has proved pepsin to be of some value. Small doses of strychnine are useful.

2. For acid dyspepsia full doses of bicarbonate of soda are naturally indicated. Professor Sée advises dyspeptics with excess of acid secretion to take a drachm of bicarbonate of soda in hot water on going to bed. It is certain that in certain morbid states of the stomach and intestines, whether due to "*hyperchlorhydria*" or to excess of mucus, the beneficial sedative effects of alkalies are pronounced.

3. Constipation is another recognized cause of insomnia, whether by the reflex irritation of retained excreta, or by the flatulence which frequently attends a loaded colon. Here the remedy is obvious: such laxatives as rhubarb, Glauber's salts, cascara, enemata of hot water, etc. Persons who sleep poorly from this cause often find a hot-water enema on going to bed a sovereign remedy.

When that old bugbear, a torpid liver, is at fault (if this can be determined), of course a blue pill, a dose of euonymin or podophyllin would seem to be indicated.

There is an acidity of the stomach which depends on abnormal acid ferments, the products of decomposition of starches or sugars in the food. In these cases, washing out the stomach by means of emetics and copious draughts of warm water every night for three or four nights, as MacFarlane recommends, often proves very efficacious. The same writer advises ferro-alumen in 3-grain doses for pyrosis along with 3 drops of dilute hydrocyanic acid, and turpentine in 10-drop doses for flatulence, as most effective remedies.—*Boston Medical and Surgical Journal*, June 25, 1891.

THE TREATMENT OF OTALGIA.

In the *Journal de Médecine de Paris* for June 14, 1891, DR. GOMPERZ writes that the treatment of earache necessarily varies according as to whether the cause is found in a circumscribed or diffused external otitis, purulent or catarrhal otitis of the middle ear, or whether it be otalgic or neuralgic in character. In the earache of external otitis, scarifications with local blisters and applications in the form of aural suppositories are of the greatest value, and he recommends the use of suppositories made with gelatin and containing $\frac{1}{8}$ grain of morphine and cocaine each, or extract of opium may be used in somewhat larger amount. Solutions of boric acid and instillations of solution of cocaine may be well combined with this treatment. Even six or ten per cent. solutions of cocaine may be used, to which a little glycerin has been added, and may be of advantage in diminishing inflammation. Otalgia may result from dental decay or ulcerations in the gums or cheeks; when such can be detected, the application of cocaine to the region will almost always produce immediate relief of the pain.

STOMACH-WASHING IN INFANTS.

This procedure has been the subject of much discussion during the past few years, and seems to be growing in favor. Its most active advocates are among those who have had most experience in its use. It has been thus far most extensively employed in hospitals, and in many institutions has already become an established method of treatment. With the appliances always at hand, and with the skill that comes from experience to both physician and nurse, it is a most simple and effective measure. In private practice, with a physician of less experience and a nervous mother or nurse for an assistant, it is obviously less satisfactory. It will probably never become as popular in private practice as other simpler but less effective measures. It is a mistake to suppose, however, that it is a serious operation, to be tried only as a last resort. DR. BOOKER, in the *Johns Hopkins Hospital Bulletin*, describes minutely his method, which is very simple and similar to that of Epstein. A soft Nélaton's catheter, about No. 9, is attached by a short glass tube to a common rubber tube two feet long, with a two-ounce glass funnel fitted into the distal end. This is all the special apparatus needed. A pitcher containing half a gallon of tepid water is placed in a convenient position for use. Sometimes it is of advantage to add a teaspoonful of equal parts of bicarbonate and benzoate of sodium. The child is held in the nurse's lap in a sitting posture, with the head slightly bent forward and the hands confined by the nurse's left arm passed across the chest. The child should be protected by a rubber sheet. The tube is moistened with water, inserted into the mouth, passed back to the pharynx, and directed downward through the œsophagus into the stomach. Gagging or even vomiting may occur, especially if the tube is delayed in the œsophagus or pharynx. This usually ceases when the

tube reaches the stomach. If it continues, the tube should be drawn up a little and carried to one corner of the mouth. It is unnecessary to depress the tongue, a procedure which is apt to provoke vomiting.

When the tube is in position, an ounce or two of water is poured into the funnel, held just above the level of the child's head. By lowering the funnel before the water has fully flowed out of the tube, the contents of the stomach are readily drawn out by siphon action. The tube is then raised and the funnel again filled, and the process is repeated until the water flows away clear. There is no possibility of the tube's entering the larynx or perforating the walls of the stomach.

The stomach-tube is employed for three purposes,—1, in the study of physiological digestion; 2, in the study of changes taking place in disordered digestion; 3, as a therapeutic measure.

Troïtzky has recently reported a large number of cases satisfactorily treated by stomach-washing. The best results were obtained in simple gastric dyspepsias without fever. In chronic diarrhœa or gastric disorders it is often of value, but must be accompanied by the use of medicinal measures.—*New York Medical Journal*, August 8, 1891.

CHLORIDE OF METHYL AS A LOCAL ANÆSTHETIC.

Dr. S. E. Berezovsky (*Letopis Khirürgitcheskaho Obshtchestva V Moskve*, December, 1890) describes experiments on dogs which he has made with the object of testing the anæsthetic action of chloride of methyl, as well as its effect on various animal tissues. The substance was used in the form of a spray. The experiments showed that,—1, a spray of two seconds' duration, when directed against intact integuments, produces complete anæsthesia lasting from fifteen to twenty seconds, the tissues remaining sufficiently soft to allow cutting; 2, a spray of five seconds' duration, while inducing a somewhat longer anæsthesia, freezes the skin to an inconvenient degree; 3, a seven-seconds' spray gives rise to consecutive local congestion and inflammation; 4, a twenty-seconds' spray causes sloughing of the tissues down to the muscular layer; 5, a convenient and harmless anæsthesia induced by a two-seconds' spray, can easily be prolonged up to five minutes by repeating the spray at short intervals; 6, sufficient anæsthesia of exposed bones can be produced in the same way; 7, the spray does not cause either gangrene or thrombosis of blood-vessels. The author next employed chloride of methyl (a spray of two seconds' duration, repeated according to the necessities of the case) as a local anæsthetic, in a long series of operations, such as circumcision for phimosis (four cases), removal of elephantiasis of the prepuce (one), evulsion of toe-nails (two) excision of cancer of the lip (two) and atheroma (three), large post-auricular dermoid (one), incision for empyema (two), scraping out tuberculous ulcers and fistulæ, etc. The results were invariably most satisfactory, the operation being in all cases absolutely painless from the beginning to the end, while the healing of the wound left nothing to be desired, even in badly-nourished patients. The only disagreeable effect was a burning sensation at first; this, however, quickly gave place to complete numbness of the area sprayed upon. On the whole, the writer concludes that the chloride of methyl spray can be employed in all cases where an ether spray is used as a local anæsthetic; and that the former should be preferred to the latter, since (1) it induces anæsthesia "incomparably more quickly than" ether spray; (2) chloride of methyl is uninflammable, and hence can be safely employed in cases of cauterization, etc.; (3) it does not undergo any change from exposure to light or air; (4) it does not irritate mucous membranes even in children; and (5) it is cheaper than ether, since only very small quantities are required.—*British Medical Journal*, August 1, 1891.

HYDRASTIS CANADENSIS IN THE TREATMENT OF NIGHT-SWEATS IN PHTHISIS.

Dr. Cruse states, in the *Internationale Klinische Rundschau* for June 7, 1891, that having occasion to use this drug recently in some cases of hæmoptysis occurring in consumptives, he found that, in addition to the favorable influence on the pulmonary hemorrhages, that the night-sweats, which before had been very distressing, were now entirely prevented. This effect was especially marked in one case in the last stage of phthisis, in which he had for some time been compelled to resort to the almost continuous employment of hydrastis for pulmonary hemorrhages, and in whom the night-sweats were by this treatment entirely arrested. The author also refers to several other cases in whom atropine, agar-

acine, sulphonal, and ergot had only at first given some relief and afterwards proved inefficacious, and in whom he had resorted to the hydrastis, giving 30 drops each evening of the fluid extract. In all great relief of the night-sweats was obtained.

CHLORIDE OF AMMONIUM IN INFLUENZA.

According to the Paris correspondent of the *Lancet* for June 27, 1891, at a recent meeting of the Academy of Medicine, M. MARROTTE advocated the use of chloride of ammonium in the treatment of epidemic influenza in preference to sulphate of quinine, as urged by M. Gellié, of Bordeaux, in his recent paper read before the Academy. M. Marrotte speaks very highly of the results obtained by chloride of ammonium, the advantages of which over quinine he claims to be that it is much cheaper, more rapid in its action, and brings about a more complete and definite cure. It is more especially in those forms of the disease which are complicated by pulmonary congestion or inflammation that chloride of ammonium will be found serviceable. From fifty to eighty grains may be given in twenty-four hours in the form of eight-grain powders, which may be conveniently concealed in a wafer. As the treatment of influenza is unfortunately, like many other therapeutic problems, a very open question, perhaps some of your readers on your own side of the Channel, whose opportunities just now are only too unlimited, might put the drug to the test and record their experiences.

ELEVATION OF THE PELVIS AS A MEANS OF RELIEVING VOMITING OF PREGNANCY.

In the *Montreal Medical Journal* for June, 1891, SIR JAMES GRANT, M.D., writes that some years ago he was called to attend a lady in her first pregnancy, about the third month of utero-gestation, who for about ten days had been unable to take food and with great difficulty retained even the smallest quantity of liquid nourishment. Almost every form of treatment had been tried without any good result, and as a last expedient he decided to test the effect of elevation of the pelvis, which was accomplished by lowering the head and thorax, and placing several pillows under the sacrum. In a short time the change for the better was encouraging, and, continuing the position at intervals for a few hours, in two days the marked improvement in the system was quite evident, and utero-gestation proceeded to the full term without any return of this abnormal condition.

Within the past month, two cases of severe vomiting in early pregnancy came under observation, in both of which the same treatment was adopted with equally satisfactory results.

Guémot, referring to the rational treatment of vomiting during pregnancy, says that a morbid or abnormal state of the uterus, the nervous system, as the carrier of reflex action, and the stomach are the prime factors in the malady. The idea of Smellie's, that the complaint is "chiefly occasioned by fulness of the vessels of the uterus," certainly is most rational. The elevation of the pelvis gradually lessens the quantity and force of the blood in the uterine vessels.

EPHEDRA VULGARIS AS AN ANTI-RHEUMATIC.

In a preliminary note in the *Bolnitchnaia Gazeta Botkina*, No. 19, 1891, DR. P. V. BEKHTIN, of Professor L. V. Popoff's clinic, in St. Petersburg, describes a series of therapeutical experiments with the *Ephedra vulgaris*, or "steppe raspberry" (Russ. *Stepnaia malina*), which plant (a member of the natural order Gnetaceæ, which grows abundantly all over Russia) is regarded by the Russian peasantry as a sovereign remedy for rheumatic and syphilitic affections. The observations were made on sixteen patients, of whom four were suffering from acute articular rheumatism (in one case complicated with pericarditis), two from chronic and two from acute muscular rheumatism, six from chronic and one from rheumatic sciatica, and one from rheumatic osteomyelitis. The remedy was used in the form of an "infuso-decoction" of one drachm of powdered stems and roots of the plant, and six ounces of water, a tablespoonful being given every two hours. The following are the principal conclusions arrived at: 1. The steppe raspberry is decidedly one of the most valuable antirheumatic remedies yet known. 2. The best results are obtained in cases of acute articular and muscular rheumatism. Even on the second day of the treatment pain greatly decreases, and the pulse and respiration become slower while growing fuller and stronger. In a couple of days the temperature returns permanently to normal, and articular swelling completely disappears, and in seven or ten days the p

tient is quite well. In the complicated case the pericarditis subsided, together with the other morbid phenomena. 3. In chronic cases the remedy acts somewhat less strikingly and less rapidly. Of the eight cases, in four (muscular rheumatism) a complete cure was effected, while in the other four (two muscular, two articular) a great improvement was obtained. 4. In rheumatic osteomyelitis and sciatica, however, the remedy seems to produce only slight and temporary amelioration. It may be added that in both the cases all ordinary antirheumatic drugs (salicylate of sodium, antipyrin, antifebrin, salol, phenacetin, etc.) utterly failed to afford any relief. 5. Ephedra invariably has a beneficial effect on the gastro-intestinal tract, habitual constipation disappearing, etc. 6. The remedy also appears to possess a diuretic action, which is especially pronounced in cases of articular rheumatism. Dr. Bekhtin adds that he made some experiments on frogs, injecting hypodermically a fluid extract of ephedra (strength not stated) in the dose of 1 cubic centimetre. The injection gives rise to initial violent general excitement of three or four minutes' duration, followed by a total inhibition of reflexes and sensibility, with considerable slowing of the hearts' action and respiration. The symptoms last from half an hour to an hour, after which the animal slowly returns to its normal condition. Some time ago Professor Nagai, of Tokio, succeeded in isolating from the plant an alkaloid, which he termed "ephedrin." According to Professor Kobert the substance, when injected into dogs and cats (in the dose of .2 gramme), causes intense excitement with general convulsions, exophthalmos, and mydriasis. Dr. Miura, of Tokio, uses hydrochlorate of ephedrin as a mydriatic. —*British Medical Journal*, August 8, 1891.

THE STERILIZATION OF MILK.

The first endeavors to sterilize milk were made chiefly from a commercial stand-point, —*i.e.*, to preserve the fluid sweet a longer time. But, as the knowledge of pathogenic germs and the action of ferment-organisms became clearer, the suggestion naturally entered the medical mind to sterilize milk from a hygienic and therapeutic point of view, chiefly for the nourishment of infants in health or disease (from the *Bacteriological World*).

A large number of experiments have been made by various experimentalists, with a view to discover the most practicable means of sterilization combining effectiveness, cheapness, and harmlessness.

To that end, drug after drug, gas after gas, were tried in vain. We have still to rely on the action of heat, though perhaps electricity under proper conditions may prove successful. But for every home, for every physician, heating is the only practical process.

To kill all the bacteria usually found in milk—and there is always a wonderfully great and diversified army of them—it requires heat a few minutes above 224° F. A special steam sterilizer is necessary to attain such a high temperature. The same effects may be obtained usually by boiling the milk about thirty minutes. Heating a few minutes between 158° and 176° is sufficient to destroy temporarily the energy of a large number of milk microbes, including several disease-germs, but does not kill many of them, and is not, therefore, sufficient as a preservative means. This is the temperature (about 617°) the application of which is known as pasteurization.

Unfortunately for the people, there are yet some medical men who will not concede any dangerous properties to microbes, and a vast number who are in ignorance of the action of germs in milk before or after ingestion.

Is it only to destroy disease-germs that sterilization is indicated? By no means. Indeed, in infant-feeding it is chiefly to prevent the irritative action of acid produced by microbes or germs of all kinds, whether truly milk ferments, pathogenic bacteria, or organisms harmless under ordinary circumstances.

Milk coagulates, acidifies, under the influence of vegetative phenomena of various ferment-organisms. The acid produced has the most baneful action on the delicate stomach and intestinal canal of the child. Sterilization of fresh milk destroys the property of the germs before any acid is produced by their process of nutrition.

Besides the true milk-ferments of various kinds, there is a number of cocci and bacilli which grow in milk. Among the former there are many which produce acids. Hence they, too, are deleterious and dangerous in the milk fed to the young.

Duclaux, in his researches on the subject, noted that milk sterilized at about 167° F. was about free from acid-producing germs, but still contained live bacilli,—a class of microbes apparently more difficult to alter, acting chiefly on the casein, and producing, as a

rule, alkalinity instead of acidity. This fact suggested to the mind that, even though the heating of milk be not carried to the boiling-point, it may be very useful in arresting the growth of the acid ferments, and leaving therein the bacilli, causing, by their nutrition, alkalinity of the media. We all know how frequently lime-water is administered to bottle-raised babies to counteract the effect of acidity. Theoretically, we might, on the same principle, ascribe a beneficial influence to the alkaline-producing microbes left in the milk by pasteurization,—influence which may be doubly useful because these organisms live at the expense of, and, therefore, reduce the casein, which, in cow's milk, is always in excess of the necessary quantity for very young children.

In the careful, constant use of pasteurized milk there is neither colic, green diarrhœa, nor other intestinal disorders so common when using raw cow's milk; but if the milk be highly heated, say at the boiling-point, for several minutes, it is cooked and the casein is affected; it digests well, but there may be some slight colic, owing to the hardness of the fæces, and consequent interference with the naturally easy and frequent evacuation of the bowels at a tender age. But there are not any other intestinal troubles.

Pasteurized milk, however, should be used early, for it will not keep long, the germs not having all been permanently arrested; therefore, only careful methodical people can safely utilize it. Thorough sterilization, on the other hand, is practicable by all who may provide a vessel of some kind to boil water. To heat the milk at any temperature, it may be put in nursing-bottles, plugged immediately with clean cotton wool (absorbent cotton), and then the bottles should be placed in a water bath, allowing the water and bottles to heat simultaneously. There are more convenient steam sterilizers manufactured now for the purpose.

We have caused the use of both sterilized and pasteurized milk in a number of bottle-raised children in the last two years with marked success, and we would recommend to doubting physicians the careful study of fermentation, coagulation, and digestion of milk, and the effect of pasteurized, sterilized, and raw cow's milk on the sensitive digestive organs of the young.

It must not be forgotten either that the germs of cholera, typhoid fever, fibrinous pneumonia, and others are destroyed or arrested in their pullulation by a temperature not higher even than that used in pasteurization,—*i.e.*, 158° to 167° F.—*Druggists' Circular*, July, 1891.

THE PATHOLOGY AND TREATMENT OF ANGINA PECTORIS.

For the last few months, with the exception of tuberculosis, no subject has more generally attracted the attention and excited the interest of the medical profession than the pathology and treatment of angina pectoris. In the May number of the GAZETTE of this year we devoted considerable attention to the discussion of this subject held at the Medical Society of London at successive meetings, and as a continuation of this subject we reproduce an abstract of a clinical lecture recently delivered by PROFESSOR NOTHNAGEL, of Vienna, which may well be accepted as representing the German views on this important subject.*

Professor Nothnagel used as the text for his address a patient suffering from insufficiency of the mitral and aortic valves, complicated with a series of symptoms which play an important *rôle* in the clinical treatment of heart-diseases.

From his history we learn that the patient suffered for a short time in 1859 from intermittent fever which recurred in 1860 and 1866, persisting several weeks. In the winter of 1889 he had an attack of influenza, after which, without any other apparent cause, violent beating of the heart ensued, accompanied by pains in the cardiac region and distressing difficulty of breathing, so that the patient had the sensation of dying during these paroxysms and was forced to assume the erect posture in order to breathe. Despite rigid dietetic precautions, the attacks were repeated, especially in the evening, and as he noticed their more frequent recurrence after late suppers, he dispensed with the evening meal altogether. In May of this year violent pains appeared in the cardiac region, with palpitations, returning after the lapse of two hours. After a half-hour's pause, difficulty of breathing set in. After ten days this condition ceased, and at present the patient is very well; he complains of occasional difficulty of breathing, which, however, is caused to disappear by deep inspiration.

We perceive that the patient, in the course of a valvular disease,—insufficiency of the

* Abstract of a translation prepared for the GAZETTE from the *Internationale Klinische Rundschau* by Mr. J. Helfman, Detroit, Michigan.

aortic and mitral valves having been recognized, without disturbance of compensation,—presents symptoms of a definite character, which do not directly depend upon the valvular defect. The statements of the patient do not afford us a distinct image of those symptoms comprising that condition which we designate by the name of stenocardic attacks, stenocardia, angina pectoris.

In the majority of cases of heart-disease the patients either have no subjective difficulties, or, when such are present, they manifest themselves in the form of dyspnœa, or a sensation of oppression, which occurs either after severe exertion, or, finally, in connection with disturbances of compensation. Here enters into symptomatology of heart-diseases a new feature,—namely, the element of pain. It is known that pain may occur in a series of heart-affections,—a pain manifesting itself as hyperalgesia in the cardiac region and thence radiating out over the thorax. In such cases the pains have a definite character; they occur in the form of attacks which, as stated before, are briefly termed stenocardic paroxysms, anginose troubles.

The classical picture of these paroxysms, judging from the portrayal of the patients, is that of one of the most dreadful of human experiences. Its chief and characteristic feature, as given unanimously by all patients, is the sensation of impending death. He who has never experienced such sensations cannot possibly form of them even an approximate conception. It must be the most appalling of human trials. The dread of death in full consciousness must be the most thrilling of sensations. To this sense of destruction are added pains in the cardiac region, rendering the condition more tormenting and insufferable. The patients state that they are seized with grasping or clawing pains in the heart region, and that they feel as though the heart were standing still and life ebbing away. But the pain is not confined to the cardiac region alone, but radiates thence into the left half of the thorax,—even into the left arm and down to the very fingers. It happens in some cases that the pain attacks the right arm, and the left as well as the right arm may become its seat. Besides the feeling of pain, which varies in intensity in the different paroxysms, the patients undergo paræsthesia in one or the other upper extremity,—a sensation of numbness, of tickling, of formication, and of transient weakness,—a paresis of the upper left extremity. With this is associated, though not in all cases, a feeling of inability to breathe, but this gives way to the sense of destruction, and the pain. The phenomena are of varying degree and very different duration. Some patients are attacked by this feeling only a few times during their entire existence; in other instances these paroxysms are more often repeated.

The objective process is a varying one and does not accord with the subjective statements of the patients. Frequently the latter present an expression of the profoundest anxiety. If they are attacked by this feeling suddenly on the street,—and in general the paroxysm does not approach gradually, but occurs in the midst of a general feeling of well-being,—the victims look for a support, lean against a wall or a tree, and stand motionless, most of them instinctively finding in absolute quietude their best relief. The visage is usually unchanged, or it becomes anxious; respiration is in most cases calm, though the sufferer has a feeling of dyspnœa. At other times, in consequence of the pain, it becomes irregular, at times hurried, at times retarded, now very deep, and now scarcely perceivable. Especially in patients suffering from general arterio-sclerosis or genuine contracted kidney, the predominating feature of the disease is the occurrence of accesses which, in their sudden approach and severe dyspnœa, bear a certain resemblance to bronchial asthma, and even the most expert observer cannot be prevented from mistake in many cases. The pulse also changes in character and frequency. In one the pulse is calm and even, and the paroxysm proceeds, despite the most terrible agony, with calm respiration and normal pulse. At another time modifications ensue; the pulse becomes arhythmic, or presents those peculiarities which are evidence of a definite anatomical heart-affection. At times the heart-tones assume a fœtal character. The tones become duller and lose the measured rhythm of the healthy adult, and assume a uniform intensity, the pulse becoming very frequent and weak. The heart-beats are then not only subjectively felt by the patient, but also found by the physician to be vibrating in character. In other cases the pulse becomes extraordinarily retarded. Traube, who suffered from such attacks, observed this phenomenon in himself. Traube, with his brilliant powers of observation, once in the very midst of an attack, and under frightful pain, took accurate notes and found that the pulse had sunk to 28 per minute, when insensibility supervened. Thus it will be seen that in individual cases the frequency of the pulse is materially reduced, and instances have been reported by

many observers in which the frequency fell below that noted by Traube in himself.

The loss of consciousness, described by Traube, is not of invariable occurrence, and when it occurs it is the result of several factors, such as depressed cardiac activity and the overwhelming pain, which tends reflexly in this direction, and the feeling of impending death: all these factors, when occurring with special suddenness and intensity, may cause loss of consciousness.

Other troubles, such as nausea, disposition to vomit, pains in the more remote nerve domain, as also in the province of the cervical and lumbar nerves, painful accesses in the abdominal organs, may occur and impart a special stamp to the disease.

Objectively, little is to be observed aside from those modifications comprising the fundamental ailment, which in different patients have such manifold forms.

The most various deviations from this picture at times occur. There are instances in which the radiation of the pain is entirely absent and the access is limited to the feeling of oppression in the breast and the dread of death; even the pain in the cardiac region may be lacking, and the paroxysm consist exclusively of anxiety with facial pallor and thready pulse. The diagnosis may also be rendered difficult, if, as is at times the case, the heart-symptoms fall to the background and the patient complain only of paroxysmal paræsthesia in the arm and impeded breathing.

The access may last a few seconds; at another time, several minutes, and may extend over hours; in the latter case we must look upon the matter as comprising a number of attacks following one another at short intervals.

It may now be asked, Under what conditions does this disease arise? How is it to be explained?

The disease occurs under varying circumstances and varying etiological relations. As fluctuating as this condition may be in kind and intensity, the fundamental features of the disease are always present,—namely, the pain, the oppression of the heart with feeling of destruction, and radiating pains in the arms.

There are three etiological groups of angina pectoris to be distinguished.

First, we must distinguish pseudo-anginose difficulties, not so named because the patient has no pain, but because the pain is not conditioned by a heart-affection, but has its source in other causes. As a second group, we may designate all those cases which occur in sclerosis of the coronary arteries. Germain-Sée, Ziegler, Leyden, and others have of recent years emphasized this connection between endarteric modifications in the coronary arteries and angina pectoris, and Cohnheim has even proved its existence experimentally in animals. This is the severest and most ominous form of this condition. A third group arises, with valvular defects, and finally, fourth, there is a pseudo-angina accompanying diseases of other organs.

Heberden and other investigators have proved that, at times, in the hearts of patients suffering from stenocardic spasms, no anatomical modification can be found, and for a long time Heberden's view prevailed, that angina pectoris was dependent upon vascular convulsion,—upon a convulsion proceeding from the aorta and extending to the vessels of one or both upper extremities; until, finally, through numerous post-mortem examinations, it was found that this peculiar condition was based upon sclerosis of the aortic system, and especially of the coronary arteries. The sclerosis of the coronary arteries forms a special and very important chapter in angina pectoris; however, this sclerosis is a not too frequent, though not uncommon, phenomenon, which, when extending to the small arteries and seizing upon the coronary arteries, produces modifications of the heart-muscle. It may be readily seen that the coronary arteries, like other periphery vessels, may be attacked by arterio-sclerosis. An endarteric degeneration develops in them, and, as a result, further modifications in the vascular wall. Not seldom may we observe myocarditic modifications in the heart. These myocardic modifications have frequently a very definite localization: we find here and there on the cardiac wall spots which have a sinewy-striped appearance, and are to be traced back to a transformation of the cellular tissue of the heart-muscles. Anatomical researches have shown that these partial chronic myocardites have their origin in a sclerotic modification of individual coronary arteries. These vessels are particularly end arteries, and in consequence of sealing one branch thereof, caused by an endarteric process, a thrombus forms, and the final result is, as the province of nutrition of this artery is closed, that a thrombotic softening of the affected heart-portion develops, and this part finally undergoes regressive metamorphosis. It is noteworthy that the modifications in the heart do not rest with the softening or fatty degeneration of the muscular system, but, on

the contrary, there results also on this spot a morbid growth of cellular tissue, so that we see a welted or callous myocarditis develop. This, accordingly, is the resulting condition from the partial sealing of the coronary arteries. Chronic myocarditis, as we find not infrequently, begins at this point in most cases, although due to other causes as well.

These modifications ensue only when smaller branches become gradually sealed; but it may also occur that larger branches may become obstructed, and when the lumen of the chief stem of the coronary arteries is invaded, a condition results which bears the greatest similarity to that of angina pectoris. This sealing has been artificially produced many times, by closing the coronary arteries, thus producing similar phenomena. Such experiments have been largely instituted by Cohnheim. If in curarized and artificially-respiring dogs one of the chief branches of the coronary artery is shut off, after a few seconds the number of heart-contractions diminishes materially; the heart-function becomes irregular and suddenly both ventricles stand still, while the auricles continue to contract. After one to two minutes, the heart stands still, and if then the obstruction be removed, and the vessel fills with blood, the heart's action soon returns to its normal course.

What was here experimentally produced occurs also in man. A number of cases have been described in literature—and such cases, moreover, are more frequent than the reports—in which sudden death, abrupt stoppage of the heart, was caused by an embolus in the coronary artery. This embolus may proceed from the aorta into the coronary artery, and it is easily perceived that when this happens the entire heart-muscle is shut off from access of blood. The further consequences take place in an analogous manner in the remaining organs, hence complete anæmia and absence of oxygen, producing collapse of the heart-muscle. Thus it will be seen that the most dangerous consequences, and even death, may ensue as a result of such a sealing of the coronary arteries.

In accordance with the stated anatomical condition of the heart, it is probable that the angina pectoris, at least in part, is caused by sclerosis of the coronary artery, for it may be readily assumed that the endarteric process, which attacks the peripheral arteries, may in a similar manner invade the coronary artery and its branches. But, as stated, this does not always seem to be the case, and there are many authenticated cases of stenocardia in which no sclerosis of the coronary artery, and indeed no sclerosis of the vascular system, was found. The author has compiled statistics on this subject, and finds that idiopathic hypertrophy of the heart, fatty and callous degeneration of the heart-muscle, concretio cordis,—that all these conditions seldom or never accompany angina pectoris; on the other hand, *anginous symptoms are more frequent in valvular defects,—that is, in distinct valvular defects, especially those of the aorta.* This fact was observed by earlier investigators,—Payer, Germain-Sée, and Romberg. Nothnagel has himself made observations in fifteen hundred cases of valvular defect, and found angina pectoris to occur in only one instance of stenosis, ostii stenosi sinistri, but in that case only two paroxysms were observed in a year; secondly, the clinical diagnosis was not made with absolute certainty; and, finally, there was no post-mortem, so that this case cannot be cited as counter-proof against the view that stenocardic paroxysms ensue in valvular defects of the aorta,—that is, insufficiency of the aorta as well as in stenosis ostii arteriosi sinistri and in the combination of a stenosis and insufficiency.

In another series of cases we see pronounced and severe anginous troubles, especially in disease of the aorta, which does not include the valves, but the aortic walls themselves,—namely, in aneurisms. Aneurisms are a frequent source of anginous complaints, and you must make it your endeavor, when patients complain of the troubles previously described, such as pains in the cardiac region, with oppression and radiating pains in the left arm, to look out for aneurism.

This fact, that anginous difficulties are wont to arise not in valvular defects of the mitral valve, but in those of the aorta and in arteriitis of the aorta, has led to the belief that the occurrence of stenocardic paroxysms must perhaps be explained in a very special manner. It has been stated that the anginous difficulties supervene under other conditions,—namely, in hearts which anatomically are not at all modified. Under such circumstances they form not a typical, pure symptom, but one similar to that of nervous, neurasthenic individuals,—notably not seldom where the subject has heard complaints made of this condition.

Furthermore, this symptom occurs in poisoning, and, first of all, tobacco-poisoning. Tobacco-poisoning does great injury to a wide variety of organs, of which three should

be specially mentioned as more particularly and regularly susceptible to this poison,—*i.e.*, the heart, the stomach, and the eyes. Among the symptoms occurring in the heart of a smoker, the anginous difficulties are to be included.

There are, further, stenocardic complaints which occur reflexly, for example, when occasioned by dyspepsias. There is a so-called dyspeptic asthma, a disease similar in symptoms to angina pectoris, which disappears when the patients diet, take a Karlsbad cure, or otherwise treat the dyspeptic disturbances.

We may now ask, What are the anginous difficulties? Whence do they proceed?

The symptoms of angina strongly recall a neuralgia, and this name was given by Romberg, to whom we owe the first classical description, in his excellent work "On the Functional Neuroses of the Heart." Romberg designates the stenocardia of Heberden as a neuralgia of the cardiac plexus, and we must confess that we in our day have not yet progressed much further in the recognition of this disease: that we must seat the pain in the cardiac plexus, but whether this plexus is alone involved, or whether other places are the centres of the affection,—on that score we are yet in the dark. If we consider the affection of the sympathetic in connection with the sense of expiring, with the anxiety and oppression, which these patients have in their paroxysms, we must assume also an affection in the brachial plexus,—likewise for the purpose of explaining the anæmia and the radiating pains in the one arm, or even in both plexuses. It is beyond doubt that these phenomena—the pains and paræsthesia about which the patients complain—localize themselves in the region of the tracheal plexus, and we must look upon them as irradiated from the cardiac plexus. Whether this radiation takes place in the central nervous system or follows in the peripheral courses, we do not know; that it takes place, however, we may conclude from analogous processes in other nerve regions. Shoulder-pains are mentioned even by Hippocrates, and appear with pains in the liver. We assume in the latter case that the pains leap from the phrenic nerve to the plexus brachialis, and in a similar manner we must explain the pains in the arm when a disturbance of the heart's sympathetic occurs. Whether these pains go out from the heart-muscle itself is a question which we can neither affirm nor deny.

Professor Nothnagel has another theory for the stenocardic pains,—namely, that they are to be regarded in part, or at least in individual cases, as *vascular pains*. It is his conviction that the arteries are capable of the most violent impressions of feeling. Under pathological conditions, violent pains may issue from the arteries; hence the anginous difficulties which we see in aneurisms, and which appear in insufficiency of the aortic valves and in stenosis of the left arterial ostium, must perhaps be referred to disease of the arterial wall. We know to-day that the arterial wall is possessed of sensible fibres. Not only is it known that Pacinian corpuscles, which have been shown by Thoma to exist in the arterial wall, here occur, but we have other physiological and pathological factors which support this assertion. And here we begin to trench on the domain of hypothesis and conjecture.

Many authors regarded the causes of the paroxysms as seated in a suddenly-increasing debility of a heart already enfeebled, acute expansion of the ventricles thus following abnormal influx of blood. As proof, the fact is cited that the attack frequently ensues when the blood-pressure has been suddenly elevated; for example, after bodily movement, after mental excitement, after overloading the stomach, etc. Recent authors have opposed this theory, asserting that cardiac debility was by no means necessary to the occurrence of a stenocardic access, and that this debility is by no means a constant symptom in this condition. For this reason authors have brought forward other theories, and Germain-Sée and Bouchard regard stenocardia as conditioned by acute anæmia of the cardiac muscle. If the heart beats calmly no symptoms occur; as soon, however, as the patients undergo severer exertion they are attacked by pains; there ensues transient anæmia of the heart-muscle, which is combined with excitation of the sensible nerve-elements, and in certain conditions is followed by motoric debility of the heart-muscle.

Prognosis of the individual stenocardic paroxysms is varying. Mild attacks may pass over without pronounced subjective symptoms, others may cause the most terrible agonies, and frequently the first access terminates fatally,—at the very moment when the patient is attacked with sudden pain and a sense of oppression he falls dead. In other instances death follows only after the lapse of several hours, with increasing debility of the heart. When the pulse sinks to 28 beats per minute, and even lower, and becomes so feeble as to be scarcely perceptible to the touch,

when the sense of expiring becomes pronounced, and the patient falls unconscious; when, in other cases, an entire trunk of the coronary artery is obstructed by an embolus, preventing access of blood to the ventricles,—then, as you can fancy, a fatal termination may follow an attack; and, in fact, many cases are known in which death resulted from a stenocardic paroxysm. Hence you must be very careful in prognosis, especially when severe attacks follow one another rapidly. Further prognosis, with respect to the fundamental causal relations, need not be discussed. That, of course, depends on the primary disease. Whether an insufficiency of the aorta or an aneurism of the aortal arch, or a sclerosis of the coronary artery be the cause of the stenocardic access, will of course give a varying prognosis *quo ad vitam*, even though all these conditions are incurable. In an angina resulting from sclerosis of the coronary arteries, prognosis is usually difficult. Unfavorable prognosis attaches likewise to stenocardic paroxysms which are combined with fatty heart or occur in individuals of very excitable nervous temperament. If you are dealing with a neurasthenia or with a case of tobacco-poisoning, of which angina is a consequence, or with an angina which has arisen reflexly from stomach-disease, prognosis in most cases will be favorable, since the cause of the attacks is readily curable.

The therapy of angina pectoris is manifold in character, and, first of all, the cause of the primary disease must be sought. A patient smoking six to eight Virginia cigars, or forty to fifty cigarettes a day, you will of course forbid to smoke. Such a patient must give up smoking altogether, otherwise all treatment will be baffled; on the other hand, a complete abstention from smoking will soon effect a cure. A patient, suffering from stomach-trouble and collaterally from stenocardic paroxysms, must first be freed from his stomach-affection. A neurasthenic you will send to neutral thermic baths,—to Gastein or Tüffer or Neuhaus or Johannesbad or Teplitz (Bohemia), etc.,—or you may have to go through a hydropathic cure or treat him with electricity. With all these methods you will have more or less success.

What shall we do now in those cases in which the stenocardic attacks result from endarteriitis of the aorta, when they are the collateral symptoms of valvular disease of the aorta, or of aneurisms, or the consequences of sclerosis of the coronary artery? First [illegible]g attention to the therapy to be employed in sclerosis of the arterial system, Nothnagel mentions the regulation of diet, the use of the alkaline waters, and, among medicaments, those which in stenocardic paroxysms may be very well and successfully employed,—the nitrites, referring specially to nitrate of sodium, nitroglycerin, and amyl-nitrite. The nitrites have not long been used in therapy. Amyl-nitrite was first used in angiospasm in the region of the head, occurring in hemicrania. Later the nitrites were recommended in heart-diseases, and, as a result of his extensive experience, Nothnagel warmly recommends this medication. You can and you must apply the nitrites in stenocardic paroxysm, as there is no better remedy, and in most cases you will have quite good results. But, in prescribing these remedies, one must individualize rigorously. It will not do to resort at once to these remedies in every instance of arterio-sclerosis, or in a case of valvular defect or heart-disease, because the nitrites do not act in these cases, and, on the other hand, may prove dangerous. Thus, a young patient from the country came to the author recently suffering from valvular defect, with dyspnœa. The physician administered nitroglycerin, but the condition did not improve, despite treatment prolonged for weeks. The physician obviously regarded the dyspnœic attacks as stenocardia. Naturally, Nothnagel at once suppressed the preparation and began the proper treatment, producing transient improvement.

The nitroglycerin preparations may be used with success in dealing with the severer pains in distinct disease of the heart,—that is, in diseases which involve the arterial system diffusely. The writer has as yet had no experience with their application in thrombosis of the coronary artery, because he has as yet seen no case in which nitroglycerin was given and in which it was subsequently shown that the coronary arteries were diseased. But he recommends these preparations for pains which have their seat in the small arteries,—those painful sensations which characterize typical stenocardic paroxysms. There are some cases in which the preparations are useless; others in which surprising results are achieved. After a very few days, the paroxysms are wont to cease or to become milder and less frequent.

When is nitroglycerin to be employed? and when amyl-nitrite?

Amyl-nitrite you will use in the individual paroxysms themselves. As the access is at times preceded by premonitory symptoms,

the patient succeeds, by the timely inhaling of the amyl-nitrite, which he carries on his person in the form of so-called capillary tubes (pearls), in averting the attack. After a very few breaths, the patients experience a peculiar sensation,—a feeling of heat in the head and of dizziness. These are the symptoms of the beginning action of the remedy, the first evidences of amyl-nitrite intoxication. If the amyl-nitrite has any action at all in the case under treatment, it begins with the first inhalations. But there are cases in which it is of less importance to suppress the single access than to cure the morbid condition. In this respect also are the nitrites of great efficacy. The nitroglycerin is to be prescribed in tablets, which are obtainable in the apothecary-shops in two forms of dosage,—namely, ½ and 1 milligramme ($\frac{1}{80}$ grain). Nothnagel usually begins with 1 milligramme, the patients taking one tablet every morning during the first week; the second week he increases the daily dose to two tablets; in the third, to three; in the fourth, to four; in the fifth, to five. He seldom resorts to higher doses, though there are obstinate cases in which larger doses will be borne. Thus, he recently saw a patient who had taken nitroglycerin to the extent of one and a half centigrammes a day, without any disasters. Such large doses you would of course never have occasion to prescribe, because most patients would quickly present symptoms of intoxication. If this should occur with the increasing dosage before mentioned, you will then in a similar manner gradually reduce the doses, decreasing the latter 1 milligramme each week. The author would, however, emphasize the great caution needful in the administration of this dangerous remedy: the patient must be warned never to take more than 1 milligramme per dose, and when you prescribe several milligrammes daily, the patient should be instructed at what hours to take the single doses in order to anticipate intoxication. At times 2 to 3 milligrammes will cause disagreeable results. Some patients cannot bear the preparation at all, and then, of course, this medication must be foregone.

The phenomena following the employment of nitroglycerin are analogous to those which have been mentioned in connection with amyl-nitrite: sensation of heat in the head, congestion, dizziness, and intense headache. On the appearance of these symptoms of intoxication, discontinue the remedy and wait eight days or more; then begin the treatment at its beginning, and increase up to the dose which the patient bore without difficulty, and rest there for several weeks, then reducing the dose. Aside from these unpleasant accidents, the remedy is a most excellent one, and, despite some failures, in most cases good results will be obtained.

If nitroglycerin should not act, then there is nothing left for the treatment of the oft-recurring anginous troubles and their severe pains, save the application of morphine. The latter, however, does not relieve every patient.

In the non-organic forms of angina, it is difficult to decide whether we should apply stimulants or narcotics. If the angina be complicated with fatty heart, then the excitants may be successfully employed. The best effects are yielded by subcutaneous injections of camphor. Other cardiac agents, such as digitalis, strophanthus, and caffeine, have very little or no effect whatever on angina pectoris. Of other therapeutic measures nothing special is to be said, as they do not affect the primary process. You might try, with the proper indications, the application of an ice-bag to the region of the heart, or other measures which will relieve the patient's distress. Different subjects, different remedies. General rules cannot be formulated.

CHANGE OF RESIDENCE IN THE PROPHYLAXIS OR TREATMENT OF TUBERCULOSIS.

At the Second Congress for the Study of Tuberculosis in Man and Animals, held in Paris from July 27 to August 2, 1891, as reported in the *Medical News* for August 15, 1891, PROFESSOR VERNEUIL read a paper on "Emigration, or Change of Place of Residence, in the Prophylaxis or Treatment of Tuberculosis." The paper was arranged in a series of paragraphs, which may be summarized as follows: 1. Change of residence has a decided influence on the development, rapidity, and termination both of medical and of surgical tuberculosis. 2. The change may be either from the city to the country or from the country to cities; the former exerts a favorable influence upon the course of tuberculous disease, while the latter favors the appearance and progress of tuberculosis. 3. These two facts, well established by clinical observation, are of capital importance as to the prophylaxis and treatment of tuberculosis. Dr. Verneuil insisted that the patient be informed by the physician that by sacrificing

himself and not going to the country he will rapidly reach the end of his disease, while an early change of residence may entirely eradicate the trouble. It is not absolutely necessary that a patient be sent to the country. Should he live in a large city, he may be sent to a smaller city, the location and sanitary condition of which are better than the large and crowded city. A stay in the country is most serviceable in many forms of local surgical tuberculosis, such as ulcers, fistulæ, articular diseases; also in case of latent tuberculosis or of recent operation. When a patient has been sent from the city to reside in the country, he ought not to be allowed to return to his former residence before the results of a careful physical examination indicate that the return can be made with impunity. Unfortunately, fixed rules cannot be laid down, yet a change of residence made in childhood or in adolescence ought to be prolonged until adult life has been reached; a patient ought not to be allowed to return unless his disease has at least been stationary for some time, or has preferably undergone decided improvement.

As is well known, tuberculosis is much more common in cities than in the country. It is also much more rapid and serious in cities, and certainly does not subside in as large a proportion of cases and as rapidly as in the country. We in the city constantly see mild forms of tuberculosis that have a tendency to perpetuate themselves and to reach an alarming intensity, while the contrary is observed in the country. Again, serious tuberculosis is almost always fatal in a city, but in the country cures have been reported; the average life of city tuberculous patients is certainly much lower than that of country tuberculous patients. Finally, Verneuil concluded his communication by emphasizing the great service country physicians can render by forbidding tuberculous patients to live in cities while they still present the slightest evidence of tuberculous disease.

THE THERAPEUTICS AND PHYSIOLOGY OF BLEEDING.

According to Dr. Pye-Smith venesection is indicated in—1. Cyanosis with distention of the right side of the heart, whether from pulmonary or other obstruction to the circulation. 2. Intense pain of aortic aneurism. 3. Uræmic and prolonged epileptic convulsions. [illegible]ontraindicated in fevers, inflammatory disorders, acute pneumonia, hemorrhage, and apoplexy.

The physiology of venesection has recently been studied again by PROFESSOR I. M. DOGIEL (*Vratch*, in *London Medical Recorder*). His experiments were conducted mainly upon dogs, and he comes to the following conclusions: 1. Dogs can survive, without any permanent injury to their health, after having lost from one-seventh to one-half of the animal's total mass of blood at a time. The extraction of two-thirds of the total, however, is invariably followed by death. 2. Blood-letting manifests a sharply pronounced influence on the frequency of the cardiac beats in the case of a moderately large depletion (from one-seventh to one-third of the total quantity of blood), the cardiac action becomes accelerated, while after larger losses it either quickens or becomes slower. 3. Blood-lettings also produce a marked effect on the rhythm and energy of the cardiac contractions (as details). 4. Mild bleedings (made by means of ten or fifteen leeches) either do not alter the arterial tension or slightly raise it. More or less considerable arterial bleedings either do not affect the blood-pressure or are followed by a fleeting initial fall with a subsequent rise, while venesections commonly lower the tension. 5. After moderate depletions "the pulse-wave acquires a periodical character." 6. In the beginning of a bleeding the bodily temperature slightly rises, then sinks about 20° F., and afterwards again gradually rises. 7. On repeated depletions (made every three or four weeks) the bodily weight at first increases—and that sometimes "very considerably"—but later on begins to sink. 8. The same holds true with regard to the numerical strength of red blood-corpuscles. 9. On the post-mortem examination of animals dying from bleedings, the most prominent feature proves to be a fatty degeneration of the heart and other striated muscles, as well as various viscera. In the course of a discussion, Professor A. B. Vogt and Dr. S. M. Schtcherbakoff have stated that, according to their experiments, bleedings do increase not only the number of red blood-corpuscles, but also the proportion of hæmoglobin.—*Medical Record*, July 4, 1891.

PERIPHERAL NEURITIS IN DIABETES.

In a communication by AUCHÉ, of which a summary is given in the *Neurologisches Centralblatt*, the author refers to the fact that,

although there is strong clinical evidence of the existence of peripheral neuritis among diabetics, no absolute proof that the condition giving rise to symptoms of neuritis is really one of inflammation of the peripheral nerves has as yet been brought forward. This, however, is the view which the writer adopts, and which he proceeds to prove by means of his own observations and those of others, embracing almost every form of disturbance of the nervous system occurring in diabetics. He also cites his histological observations, showing wide-spread inflammatory processes in the peripheral nerves. In the summary of his views of the subject the author states that the upper extremities are attacked with less frequency than the lower, that the affection is mostly bilateral, but may be one-sided, that the functions of the bladder and rectum are unimpaired, and that atrophy and reaction of degeneration are present in the affected muscles. Sensory disturbances, consisting of pains, hyperæsthesia, paræsthesia, or anæsthesia, frequently precede motor troubles, but may accompany them, or may occur alone. Vaso-motor troubles, such as hyperidrosis, œdema, shiny skin, and ecchymosis, may also be present as well as trophic disturbances, such as perforating abscesses, local atrophy of skin, falling off of nails, etc. The loss of knee-jerk which occurs in some cases of diabetes is to be ascribed to neuritis. The author in conclusion refers to the generally-accepted opinion that the nervous symptoms are not at all proportional to the quantity of sugar in the urine. Some researches which he made as to the effect of injections of saccharine solution in the vicinity of the sciatic nerve led him to conclude that sugar was not the active agent in setting up changes in nerve; but that such changes are more probably to be ascribed to the presence in the blood of acetone or of some as yet undescribed chemical substance.—*Lancet*, August 8, 1891.

TREATMENT OF ANÆMIA.

There are few chronic maladies in which deficient or faulty hæmatosis does not play an important *rôle*.

Indeed, many diseases would more readily yield to therapeutic measures if it were in our power to control this important and complicated function.

In this issue we have endeavored to lay before our readers some reliable observations that may aid them in this direction.

History repeats itself at the present time in the prominence which depletion has acquired in the treatment of anæmia and chlorosis.

The recent experiments of Dogiel on dogs would confirm the practical deductions of Scholz in patients referred to in our columns. Dogiel found that moderate bleeding (by ten to fifteen leeches) does not alter arterial tension or even raise it slightly; that if these are repeated every three or four weeks the patient gains weight, sometimes even considerably, and the number of red corpuscles increases, unless the bleeding is carried to excess or repeated too many times. Moreover, these experiments were verified by Vogt and Schtcherbakoff, who added that the hæmoglobin is also increased.

These results are probably due to the increased tissue metamorphosis which becomes necessary for the renewal of life, as T. King Chambers aptly puts it.

Indeed, it would seem probable that in many chronic diseases a decided impression upon the circulation, innervation and hæmatosis must prove a valuable therapeutic measure if excess is guarded against in a conservative manner.

When the empirical results are so clearly verified by physiological experiment, as appears to be the case in the matter of small bleedings for anæmia, the practitioner may safely resort to this measure, and, noting the result, carefully proceed with it.—*Dietetic Gazette*, August, 1891.

THE DIGESTIVE POWER OF THE ACIDS.

Various theories have been advanced as to the action of the various acids during the process of digestion. Most of the physiologists believe that hydrochloric acid is the only true acid of the gastric juice, the others formed from the contents of the stomach and mixing themselves with the former. Some even believe that these other acids are hurtful, and that the function of the hydrochloric acid, in conjunction with the pepsin, is not only to peptonize the albuminoid substances, but also to hinder, by preventing fermentation, the formation of lactic, acetic, butyric, and other acids, the presence of which weakens, and may even completely stop, stomach digestion. Alongside of these theories is that of others diametrically opposed, who attribute all the digestive power to the organic acids, and to lactic acid in particular. These results have been arrived at by two methods,—

1, the examination of the digestive action of a natural gastric juice, the acids of which have been previously determined; 2, artificial digestions in glass tubes, the artificial gastric juice being formed by adding together pepsin and the acid, the digestive value of which it is desired to determine.

From his researches in this direction, Dr. Georges drew the following conclusions upon the peptonizing action of the acids of the stomach: 1. Hydrochloric acid is the acid which, combined with pepsin, is commissioned with the peptonization of albuminoid substances. 2. Lactic acid, as well as acetic and tartaric acids, are totally deficient in digestive action.

Thoyer, having had occasion during the course of the year to make some observations upon this subject, had not been able to confirm the latter conclusion. His experiments have been conducted with every possible precaution and with the greatest care, and he believes that the results obtained are entirely trustworthy. These results have been of three kinds,—1, the action of acids alone upon the albuminoid substances; 2, the action of pepsin taken singly; 3, the combined action of pepsin and the acids. Various acids were employed,—hydrochloric, hydrofluoric, sulphuric, nitric, lactic, acetic, tannic, tartaric, oxalic, and citric. These were placed in test-tubes, together with small cubes of hard-boiled white of egg and some filaments of fibrin, and allowed to remain for twenty-four hours in an oven at a temperature of 38° C. At the end of that time the digestions did not appear to have commenced in the tubes containing the white of egg; in the tubes containing fibrin the dissolution of the fibrin was complete, but in neither was found the slightest trace of peptones. This proves that the acids which are contained normally in the stomach, as well as others which may be accidentally discovered there, have not in themselves any peptonizing action. The acid pepsin of Boudault placed in tubes with the white of egg, hard-boiled, and with fibrin, has determined the formation of peptones. If, however, the pepsin is chemically pure, the slightest trace of peptones cannot be found in either the tubes of fibrin or white of egg after remaining twenty-four hours in the oven at 38° C.

In testing the combined action of acids and pepsin, acid solutions of from four or five, ten or twenty, or thirty parts to a thousand have been employed. The pepsin employed was perfectly pure. The experiments were conducted in the following manner: In one series of test-tubes ten cubic centimetres of the precipitated acid solutions were placed, and to these were added two centigrammes of pure pepsin and a cube of one gramme of the white of a hard-boiled egg. In a second series of tubes were placed fifteen cubic centimetres of the same acid solutions, then five centigrammes of pure pepsin and a two-gramme cube of white of egg. Finally, two other series of tubes contained the same quantities of acid solution and pepsin, and one and two gramme quantities of fibrin. The results obtained justified the following conclusions:

1. Hydrochloric acid is the acid that, when combined with pepsin, has the most power for transforming albuminoid substances into peptones.

2. Hydrochloric acid does not alone possess the peptonizing property. With it, but to a much less degree, a large number of acids may, when combined with pepsin, give rise to this transformation of albumen into peptone. Among these acids are sulphuric, acetic, oxalic, tartaric, citric, lactic, and hydrofluoric, which possess this property in different degrees.—*Medical News*, July 18, 1891.

CLINICAL STUDY OF THE CONDITION OF THE HEART IN TYPHOID FEVER.

Dr. Galliard took careful notes of the anomalies in the condition of the heart during an epidemic of typhoid fever in Paris, in 1880, while he was *interne* under Professor Hayem in the St. Antoine Hospital. He delayed publishing the notes, as he had hoped to have made further investigations on the subject, but circumstances preventing him, he simply gives the clinical notes of the cases as they were taken at the time.

The first case was one of sudden death at the end of the first week of the disease. The patient was progressing favorably; the temperature 37.8° C. in the morning and 40.2° C. in the evening, when he became delirious, and after a short time died. No cause could be found in the post-mortem examination to account for the death.

The second case was one of collapse on the thirteenth day. There had been profuse diarrhœa, and the temperature, from 39.5° C. on the eleventh day, gradually sank to 36.1° C. in the armpit and 37.4° C. in the rectum on the thirteenth. He presented all the appearance of a cholera patient, with cold extremi-

ties, livid face, almost pulseless, and no heart-sounds to be heard. Under stimulating treatment he gradually recovered.

The third and fourth were cases of non-rhythmical intermittence of the pulse, the third exhibiting the intermission only on the day of entry (the eighth of the disease). There was a murmur (systolic?) at the apex and at the base of the heart. In the fourth case, the intermissions continued from the eighth to the twenty-fourth day. There was slight albuminuria.

The fifth was an anæmic girl, in whom rhythmical intermissions occurred after defervescence,—from the twenty-fourth day,—and lasting three weeks. There was also systolic murmur at the apex and in the pulmonary area. In the sphygmographic tracings there occurred an occasional double pulsation. The patient had also a slight relapse.

The sixth case was at first simply asthenic, with feebleness of the apex-beat and of the heart-sounds. There were intermissions on the twenty-fourth day, when the fever was abating. Pneumonia ensued, and the patient died. There was myocarditis.

The seventh case had intractable diarrhœa. At the end of the third week there was feebleness of the heart and faint first sound. Later, at the apex the first sound could scarcely be perceived, while heard distinctly over the sternum. There was also inequality and irregularity in the pulse-beats. The patient died suddenly about the end of the fourth week. Myocarditis and vitreous degeneration of the voluntary muscles were found.

In the eighth case there were systolic murmurs at the base and apex observed on the eighth day of the disease, disappearing on the tenth from enfeeblement, and the patient died on the twelfth. There was myocarditis.

The ninth case was somewhat similar to the eighth.

In the tenth there were anæmic murmurs, that persisted after recovery, and the author points out the necessity to distinguish anæmic murmurs from murmurs arising in cases of myocarditis.

The next three cases are examples of the true cardiac form of typhoid fever. There is a general resemblance in all these cases,—intermissions of the heart's action coinciding with the appearance of the murmurs, or following on the disappearance of the heart's sounds, and feebleness of the apex-beats. Towards the end the heart's action becomes irregular, accompanied by tachycardia, and is premonitory of a fatal termination, and finally syncope, preceding death. There were also complications in the lungs, kidneys, nervous system, etc. In the three cases given myocarditis was demonstrated in each one.

The last two are cases of endocarditis, the murmurs appearing in the one case on the eighth day, and persisting after recovery, and in the other case acute endocarditis was diagnosticated before the symptoms of typhoid fever developed, the murmurs persisting here also after recovery.

The author concludes with a few remarks on the causes of the cardiac phenomena, pointing out that, in addition to the local mischief, affections of various nerve-centres would account for some symptoms. In treatment, he strongly recommends the judicious and bold use of digitalis.—*Medical Chronicle*, July, 1891.

THE LOCAL TREATMENT OF DYSENTERY.

There seems to be in modern medical thought a strong tendency to consider disease as constitutional rather than local, and while not doubting that there are one or more forms of dysentery dependent upon the presence of poisons in the blood, PROFESSOR H. C. WOOD (*University Medical Magazine*, August, 1891) believes that dysentery, as seen ordinarily in this climate, is essentially a local inflammation independent of blood-poison. If this be true, the disease should be especially amenable to local treatment. It is true that the ordinary treatment, which seems not to be local, really owes much of its efficiency to a local influence. Thus, the purgative acts by a purely local depletion; the mercurial or the ipecac, by a local stimulation of the glands involved; while the bismuth spreads itself upon the mucous membranes and by its local action lessens inflammation. Some years ago Dr. Wood published a series of cases of chronic dysentery which showed the marked efficiency of enemata containing half a drachm to a drachm of nitrate of silver dissolved in two or three quarts of water. In acute dysentery, involving the colon high up, he has found enemata containing two or three drachms of subnitrate of bismuth much more efficient than the exhibition of bismuth by the mouth. When the symptoms are severe this local treatment will often be preceded with advantage by washing out the colon with large quantities of water, which he believes are much preferable to hot-water injec-

tions. When the lower part of the colon is affected the beneficial action of ice is especially marked, particularly when the ice is employed in the form of ice suppositories. These suppositories should be rapidly used, one being put into the rectum every three to five minutes, so as to get, for at least half an hour to an hour, the effect of the continuous application of cold.

When tenesmus is very severe, iodoform suppositories are often much more efficient than opium in bringing relief. Another drug which Professor Wood has found especially efficacious is ergot, especially when the passages contain large quantities of blood.

THE TREATMENT OF RANULA.

DR. B. HERNANDEZ BRIZ, of the General Hospital, Madrid, writing in *La Andalucia Médica* on ranula in children, mentions a case of one of these tumors which was as large as a hen's egg, and which he cured in a very simple way. Intending to empty it, he inserted a needle of a common hypodermic syringe into it in order to employ aspiration. The contents were, however, evidently too thick to come through such a fine tube. He then filled the syringe with a mixture of 10 parts each of tincture of iodine and water, with 1 part of iodide of potassium, and injected 15 minims of this mixture. Three days later the tumor was decidedly smaller. A second similar injection was given, and when the child was next seen, three days afterwards, the ranula had almost disappeared. Several months have now elapsed, and there is no sign of the return of the tumor.—*Lancet*, August 8, 1891.

THE INTERNAL USE OF RESORCIN.

Resorcin has not been employed to any very great extent as an internal remedy, its use being chiefly confined to external applications. DR. H. MENCHE has, however, been giving it in many internal disorders for a number of years, and reports his results in an article in the *Centralblatt für Klinische Medicin*, No. 21, 1891. His first essays were made in cases of cholera infantum, for which he gives a prescription containing from five to seven grains of resorcin in three ounces of simple syrup and water, a few drops of compound tincture of gentian, or, if thought necessary, a minute quantity of laudanum being added. In cholera nostras also good results were obtained, the vomiting being speedily controlled and the patient making steady progress towards recovery. The author holds that resorcin is indicated in all forms of gastritis, in the dyspepsia following indiscretions in eating or drinking, in acute and chronic gastric catarrh, and in rumination. In acute ulcer of the stomach, however, the drug is contraindicated. In the vomiting of pregnancy, in sea-sickness, and indeed in all forms of vomiting, from whatever cause, Dr. Menche recommends resorcin as of undoubted utility. He also used it with apparently good effect as an hypnotic in a few cases. The remedy was given in solution or in powder, the dose for adults being from 1½ to 2 grains every two hours. As an hypnotic, he is in the habit of ordering a single powder of 7½ grains at bedtime. For sea-sickness, he gave 1 or 2 grains in sugar of milk every two hours, and reports some very successful cases of this treatment. Of course, he insists upon the necessity of obtaining a perfectly pure specimen of the drug in order to secure the results desired.—*Medical Record*, July 11, 1891.

THE SEAT OF PUNCTURE IN PARACENTESIS ABDOMINIS.

TRZEBICKY (*Archiv für Klin. Chirur.*, Bd. xli., Heft 4), in performing paracentesis abdominis at the point of election,—that is, midway between the umbilicus and the anterior superior spine of the ilium,—wounded a large blood-vessel, which gave such troublesome bleeding that the life of the patient was threatened. The hemorrhage was arrested by compression of the common iliac artery. Incited by this experience, and by several reports of fatal bleeding following puncture at this point, Trzebicky conducted an experimental research upon a large number of cadavers. As a result of this he announces the following conclusions:

In a majority of cases, paracentesis performed at a point midway between the umbilicus and the anterior superior spinous process of the ilium is perfectly safe, since neither the epigastric artery nor any large branch of this vessel is liable to be wounded. The artery commonly crosses this line at the junction of the inner with the middle third.

In a certain proportion of cases, however, the epigastric artery or one of its branches lies directly beneath the point of election.

The course of the epigastric artery is sel-

dom exactly similar in the two sides of the body.

Since the artery runs within the sheath of the rectus muscle, its course depends mainly upon the position of this muscle. In case the two recti are separated by abdominal distention, the artery is displaced, so that it lies very near the point of election for puncture. The rectus muscle does not, however, bear a constant relation to the artery. At times, even though the muscle is displaced to the side, the artery lies near the middle line.

Variations in the origin of the epigastric artery seem to have no influence on the course of the former vessel.

The artery is usually accompanied by a single vein.

Paracentesis abdominis should be performed either in the linea alba or in the outer half of the line joining the umbilicus and anterior superior iliac spine. In case the linea alba is selected, it is not important to keep strictly in the middle line, since there is an arterial branch which may be wounded if the trocar is entered, even slightly, to one side.—*American Journal of the Medical Sciences*, August, 1891.

PULMONARY PHTHISIS.

At a meeting of the Pathological Section of the British Medical Association, at its recent meeting in Bournemouth, the discussion on pulmonary phthisis was opened by Dr. J. K. FOWLER with a paper on arrested pulmonary phthisis (*Lancet*, August 8, 1891). He said that the discovery of the tubercular bacillus had settled, so far as pathologists were concerned, the question, which was long discussed, as to whether phthisis was or was not always a tubercular disease. He proposed, indeed, that the term "phthisis" should be abandoned and be substituted by that of pulmonary tubercle. The term "fibroid phthisis" was unsatisfactory, as fibrosis might be due to chronic pneumonia or to the action of various mechanical irritants; that these ought to be classed as cases of chronic interstitial pneumonia, and that fibroid tubercle should be applied to those of tubercular origin. He was not satisfied of the existence of syphilitic phthisis. The so-called stages of phthisis had also to be given up. He proposed that pulmonary tubercle should be classed as follows: 1, for ordinary phthisis the term "pulmonary tubercle" was sufficient; 2, miliary tubercle for cases where the lungs only were affected, or as part of a more general tuberculosis; 3, caseous tubercle, where the process was rapid and might be disseminated, but might affect one lobe only; 4, fibroid tuberculosis, in which there was a special tendency in the tubercles to undergo fibroid change, and was distinguished from ordinary chronic tubercle with cavity formation, fibroid walls, and thickened pleura. The history of tubercle might be very varied. Next he referred to the frequency with which pathologists met with appearances which they regarded as evidence of arrested tubercle, although it was still doubted by many clinical observers. The evidences on post-mortem examination which were regarded as proof of pre-existing tubercle were, 1, pigmented fibroid tubercles, either with or without evident tubercles; 2, caseous areas, or masses with dense fibroid capsule; 3, cretaceous masses; 4, small cavities; 5, scarring and puckering of pleura; 6, local adhesions, with thickenings of the pleura; 7, caseous glands, and so forth. Any of these might be found in persons who had died of diseases which had nothing to do with tubercle, and from his statistics he found that about nine per cent. of the bodies examined showed these, and his statistics agreed with those of other observers. A large number of cases showing arrested tubercle had died of cancer. Although capsules with caseous contents occurred, he had never seen what he would regard as a cavity capable of clinical recognition in which the tubercular process had been arrested. Although some believe they could follow the closing of cavities clinically. He confessed this was beyond his powers. The further question was, What was the proof that the lesions specified really represented arrested tubercle? First, there was the fact that encapsulated caseous masses may be followed by diffuse pulmonary tubercle if the barrier of fibroid tissue were broken down. Then cases occurred in which death was the result of tubercle in other organs than the lungs. Their site at the apex further supported this view, while there was an absence of any other adequate cause to account for the lesions. The method by which arrest took place was by the formation of a barrier of living tissue and fibrous encapsulation. But after the barrier had been formed danger still existed, for the caseous mass might soften and the capsule break down. The caseous or cretaceous mass might be expectorated; and there was always the element of constitutional vigor to be

taken into account. In attempting to estimate the possibility of arrest, regard must be paid to the extent of lung affected. If cavity was present capable of clinical recognition, it was probable that, sooner or later, extension would take place. When bacilli were present in the sputum, the condition could not go on to fibrosis, but these might be present without much constitutional disturbance. Many of the cases of arrested tubercle were probably cases where there had been slight illness, and which, if they had been seen by a medical man at all, had probably been regarded as catarrh of the apex or congestion, and, if there had been hæmoptysis, the blood had come from the throat, and the recovery of the patient tended in the minds of many to confirm this view.

THE ORIGIN AND TREATMENT OF GALL-STONES.

The discussion upon gall-stones at the Medical Congress at Wiesbaden was opened by PROFESSOR NAUNYN, of Strasburg. He remarked that different views were held as to their origin. According to some they form when the bile is saturated with stone-forming material,—cholesterin and bilirubin; or the formation takes place from the precipitation of these substances due to alteration in the chemical constitution and reaction of the bile. These views are not supported by the fact that the percentage of cholesterin in the bile is very constant, and not in any way affected by food changes. It is likewise found in the blood, usually in much larger amount than the bile can contain. Both cholesterin and bilirubin deposit are furnished by the biliary passages, and the chemical alterations described by Thudichum have not been confirmed. In old age the disorder has few symptoms, and remains often unrecognized. In younger individuals, five to six per cent., or even ten to twelve per cent., of all bodies are said to suffer from gall-stones, and the nearer one approaches old age the oftener are they found. Before thirty they are rare, after sixty twenty-five per cent. of the cases occur. In women they occur five times as often as they do in men, and this may be explained by pregnancy, tight lacing, etc., causing stasis in the flow of bile. Atony may account for the frequency in old age. Gall-stones arise rather from an affection of the epithelium of the bile-passages. Recent forms of stone are small and rough, often with a central cavity filled with cheesy matter or fluid. Deposits from the bile take place later. First a layer of bilirubin forms similar to an egg-shell, and the cholesterin is laid down later as a rule. Frequently carbonate of lime is added subsequently, and the stone becomes very hard. A diseased condition of the epithelium of the gall-bladder is always present, called by Meckel "stone-forming catarrh," although desquamative angiocholitis is a better term. The clinical appearance of the disease may be divided into regular typical cholelithiasis and the irregular atypical forms. The latter often develop into carcinoma, and the prognosis is therefore bad. With regard to treatment, so-called solvent remedies have no real basis. Poisonous substances are administered, and find their way into the bile in such small quantities that their presence is with difficulty detected. A similar judgment may be pronounced upon the action of cholagogues, regarded as having an important influence upon the treatment. A well-mixed meal induces a larger flow of bile than any medicinal remedy. The excretion of bile ought rather to be mechanically helped by the wearing of suitable clothing. Antiseptics, such as salicylic acid, etc., are of little use, as indiscretion of diet readily leads to an attack; the food ought to be attended to. Carlsbad salt acts favorably, probably by the excitation of peristalsis. Surgical treatment holds out many possibilities of relief, from the position of the gall-bladder (*Berlin. Klin. Wochenschrift*, No. 15, 1891).—*Practitioner*, August, 1891.

A NEW TREATMENT FOR ALOPECIA.

The form of alopecia for which M. MOTY suggests a new plan of treatment is that which proves at times so obstinate, in spite of all applications, commonly known as alopecia areata. At a recent meeting of the French Society of Dermatologie et Syphilographie, he presented a number of patients who had been subjected to intradermic injections of corrosive sublimate in strength of 2 to 500, and claimed that the treatment had proven very satisfactory, in that the growth of hair over the bald spots had been more rapid than after other modes of treatment. A variety of vehicles had been experimented with, until it was found that an aqueous solution was the best. Several injections of not more than 5 or 6 drops are made around each patch.

Modern investigations tend to show that there is at least one variety of alopecia, occurring in rounded plaques, which is due to

the invasion of a micro organism, and the observations of Von Scholen, Thin, Robinson, and others in this field have rendered it scarcely justifiable for an author at the present day to attribute the affection to neurotic causes in all cases. If, as Robinson maintains, the organisms are situated deeply in the tissues of the scalp or other hairy portions of the skin, then the plan of treatment here suggested is eminently rational, and ought to be as successful as it is claimed.

It must always be remembered, however, that the disease is of a most erratic nature, and while at times it resists all our efforts, at others it shows a tendency to rapid and spontaneous recovery.

Besnier relates an instance in point, where a patient was treated in his service continually for two years without success. He was then sent to a colleague who continued exactly the same treatment, and a cure was promptly effected.—*Medical Record*, August 15, 1891.

TREATMENT OF ALBUMINURIA AND NEPHRITIS DURING PREGNANCY.

Dr. A. Mijnlieff gave an address on the "Treatment of Albuminuria and Nephritis during Pregnancy" at the Third Physical and Medical Congress recently held in Holland (*Geneeskundige Courant*, May 10, 1891). He says that, taking into consideration the predisposition to renal affections during the period of pregnancy, prophylactic treatment must in cases be adopted, and with greater circumspection where there has been any antecedent infectious malady. In all cases of chronic nephritis, where the danger to the mother is great, and the chances of life to the fœtus small, the period of parturition should be anticipated, while as a precautionary measure abstention from intercourse or artificial occlusion of the uterine orifice should be recommended. With regard to the treatment itself, the line must be drawn between a simple albuminuria and albuminuria the outcome of a more serious renal affection. In the former a well-regulated diet, with avoidance of an excess of nitrogenous foodstuffs, is of the first importance; all nourishment tending to congestion of the kidneys must be avoided, and a careful functional regulation of the skin and intestinal canal insisted on; light saline purgatives may be administered, and in anæmic patients iron may be given with advantage. In nephritis during pregnancy, where the renal affection is discovered during the early months, abortion may be induced where the prognosis is likely to be a grave one. Dietetic treatment will, however, in such cases also be found of great value; the milk treatment strictly followed has given admirable results. Milk may be given raw or boiled, cold or warm, according to the patient's fancy, but it would be well to habituate the patient to this absolute milk diet gradually, as the distaste for it at first is great. As a consequence, an increased diuresis and disappearance of albumen are obtained, while the best guarantee is afforded of the absence at term of uræmia and eclampsic symptoms. A diaphoretic treatment, if indicated, may be adopted either by warm baths or the pack, while the subcutaneous injection of pilocarpine (the heart's action being closely watched) will prove of much benefit. In urgent cases diuresis may be induced by the salicylate of theobromine, as advocated by Gram and Schroeder. Venesection, recommended by Charpentier and Peter, though regarded by most with scant sympathy, is of value when urgent symptoms have to be dealt with. The above-mentioned means are available either for acute or chronic nephritis. As to the question of induction of premature labor, its advisability must be considered (1) in the interest of the mother and (2) in that of the offspring. Distinction must be drawn, in considering the dangers to the health and life of the mother, between the acute and chronic forms of nephritis. In the former, where renal complications occur in a healthy woman during the earlier months of pregnancy, taking into account the serious prognosis, abortion must be induced. This complication is, however, of rare occurrence, as the nephritis usually declares itself later in the pregnancy. When renal symptoms first come into prominence during the second half of pregnancy, notably about the sixth or seventh month, premature parturition is not to be attempted unless grave indications, such as dropsy, dyspnœa, etc., supervene. In cases of chronic nephritis, consideration being given to the grave dangers that beset the mother, through rapid development of the complication as well as the inclination there exists in these cases to hemorrhage and abortion, coupled with the small chances of life for the fœtus, abortion must be induced as speedily as possible. Should a case of chronic nephritis come under observation only in the later months of pregnancy, premature labor must be induced as early as possible, every chance of life being given to the fœtus, while if ear-

lier pregnancies have afforded evidence that intrauterine death has occurred at a definite period, labor may be induced some time earlier than this period.—*British Medical Journal*, August 8, 1891.

ANTISEPTICS IN THE TREATMENT OF TYPHOID FEVER.

Since the germ-theory of disease has become established upon a firm scientific basis, the idea of treatment directed towards the neutralization of these specific organic poisons has naturally arisen. Although much progress has been already made in this direction in the treatment of many medical affections, it must be admitted that the results obtained in surgical practice are of far more practical importance than those arising from the use of antiseptics in non-surgical practice. To appreciate this we have only to glance over hospital statistics, and find that whereas the mortality of all grave surgical procedures is immensely less, the same cannot be proven of those medical cases in which a living organism has been shown to be the essential cause. The cause of this difference in statistics is obviously the comparative ease of application of antiseptic treatment in surgical practice, and the insurmountable difficulties which at present prevent its use in cases where the seat of infection is the intestinal canal and the blood itself.

While the ideal antiseptic has yet to be discovered, much good work has been done in this direction by many prominent clinicians; and perhaps no disease has been more vigorously attacked by antiseptic remedies than typhoid fever. Indeed, it may be affirmed with some truth that the idea of maintaining, as well as possible, intestinal antisepsis in this disease occurs to almost every practitioner of the present day, and in the opinion of some it is the method by which the best results can be obtained. No agent has yet been discovered which can affect the poison of typhoid fever in the circulating blood without being equally poisonous to the patient, so that at present the questions are: Can we disinfect the intestinal canal and thus favorably influence the course of the disease? Does this method of treatment give better results than when other measures are adopted?

With the numerous modes of treating typhoid fever now in vogue, the answers to these questions cannot be authoritatively made at present, but it is generally admitted that we possess certain antiseptic remedies which are capable of making the stools less offensive, of limiting somewhat the duration of the fever, and of lessening the abdominal tenderness and meteorism. Such agents are very commonly employed as adjuncts to other methods of treatment. But the effect of a *purely* antiseptic treatment upon the mortality needs further observation.

The maintenance of intestinal antisepsis depends largely upon the diet, which should be of such character as to be readily absorbed, and so contribute as little as possible to fermentation. The quantity of food is also most important, and no more should be given than can be readily assimilated, for, unless this is done, the food collects in the intestines, rapidly undergoes fermentation with the production of noxious solids and gases, and painful tympanites results. For this reason milk, diluted with lime-water, light watery soups, and proper amounts of pure water would seem the rational diet, since they are readily assimilated, and furnish plenty of liquid to carry away the waste products of tissue changes. Such a diet leaves a minimum of residue in the intestines, and hence is more suitable when intestinal antisepsis is aimed at.

The cheap drugs which have been lately used to promote antisepsis in the intestinal tract are naphthol, thymol, salicylate of bismuth, mercury in some form, carbonate of bismuth, chlorine, hydrochloric acid, turpentine, sulphide of carbon, boric acid, benzoic acid, carbolic acid, quinine, hydro-naphthol, and a number of others. The reported accounts of the use of any of these agents as an exclusive mode of treatment are too meagre to admit of any intelligent comparison of their relative values. They are all used for the same purpose, and none of them has proved entirely acceptable. Dr. J. Burney Yeo, Professor of Clinical Therapeutics, at King's College, London, has had very marked success with a mixture of chlorine and quinine, and in a late lecture (*Lancet*, April 18, 1891) he highly recommends it, and strongly urges the expediency of some means being always adopted to secure as perfect an antisepsis as possible in the intestinal tract. To those interested in this subject, this lecture is well worth careful reading, as it details the history of the application of antiseptics in typhoid fever, as well as gives his own experience. Dr. J. Mitchell Clarke has experimented favorably (*Practitioner*, December, 1888, and July, 1890) with β-naphthol and hydro-naphthol. His results

were, 1, "reduction of the average duration of the fever; 2, less offensive stools; 3, less abdominal distention; 4, early cleansing of the tongue and less dryness of mouth and lips; 5, absence of albuminuria; 6, convalescence more rapid and strength less reduced; 7, less risk of propagation of the disease; 8, diminished tendency to secondary complications." Dr. Yeo states, in his lecture above mentioned, that M. Maximovitch prefers α-naphthol to β naphthol, because it is three times less tonic, yet prevents the development of the typhoid bacillus when used in the proportion of 1 part in 10,000; and also that Dr. Moncorvo (*Satillite*, February, 1890) has given β-naphthol to children in doses of gr. xv to gr. xxx, and that such doses were tolerated perfectly.

Liebermeister (Von Ziemssen's "Cylopædia of Practical Medicine") urges the claims of mercury and iodine, giving the latter dissolved in a solution of the iodide of potassium. Mercury he employs in the form of calomel. He found the mortality less, in two hundred cases treated by calomel, than in a large number treated without it.

Experiences of leading physicians might be multiplied, but as they are too widely different as regards the conditions surrounding their cases, and the drug employed, to secure intestinal antisepsis, it is impossible to more than gain a general idea of the value of this treatment. That the idea of intestinal antisepsis is rational all admit, and it also may safely be said that the experience already obtained from the use of antiseptics is highly encouraging. The end to be obtained is most desirable, for by influencing the local condition of the gut the general toxæmia seems apparently proportionately lessened. Only time and an experience long enough to permit of the comparison of reliable statistics of the use of the several remedies lately brought forward can settle the question as to the best mode of securing the minimum amount of septic fermentation in the intestine, and, as has already been said, the kind and quantity of the food will prove an important factor towards this result. In this connection, the use of pepsin suggests itself, to complete the imperfect gastric digestion, and it is routinely given by Dr. W. H. Thomson, at the Roosevelt Hospital, New York, in conjunction with dilute mineral acids.

Since it has been proven beyond doubt that antiseptics play a most important *rôle* in the modern treatment of typhoid fever, it becomes every practitioner of medicine to consider carefully the means he shall employ to fulfil the indication which always is present in this disease. No one drug or mixture can be solely recommended for this purpose, and, further, in many cases certain remedies are contraindicated by the existing conditions of the stomach, but in all cases where no such contraindication is present, an antiseptic of known value should constitute a part of the treatment, for its *specific effect* upon the bacillus. The favorable experience of chlorine and quinine by Dr. Yeo, of calomel and iodine by Liebermeister and others, and the naphthol and hydro-naphthol by Clarke (as well as the reported value of many other antiseptic remedies), allows of considerable latitude in the choice of the drug to be employed. It is to be hoped that these antiseptics will be given a larger trial in the hospitals of this country, side by side with other modes of treatment, including the treatment by cold-water baths, as introduced by Brand, and, it is needless to say, these statistics, obtained in this way from single large hospitals, will be most valuable in determining which drug, of those already employed, will most adequately fulfil the purpose of limiting to a minimum the production of toxic ptomaïnes, or similar substances, and thus prevent their introduction into the already poisoned blood.

All our knowledge of the pathological conditions which exist in typhoid fever suggests persistent effort towards this line of treatment as being the most rational and direct method of combating the disease, and although the remedies as at present used may fall far short of perfection, still, as has been said, the experience of acute observers proves how much room there is for hope in this direction.

Enough proof of the efficacy of the antiseptic treatment of typhoid fever is forthcoming to warrant the assertion that it should be given a high place among the measures usually employed.—*Medical and Surgical Reporter*, July 18, 1891.

DIURETIN IN THE TREATMENT OF DROPSY.

It would seem as if any remedy that stimulated the renal epithelium might be regarded as a specific against dropsy. But there can be no infallible diuretic drug, since in some cases of general œdema the epithelium—*i.e.*, the secreting structure itself—is at fault. The alkaloids caffeine and theobromine are diuretics of great power; but the former has

the drawback of primarily increasing arterial tension by its stimulation of the vaso-motor centres, and thus may even diminish the urinary secretion in cases in which the intravascular blood-pressure is already too high. In large doses, however, this action upon the nervous system becomes subordinated to its influence upon the kidneys, and free diuresis effected. Still, an objection to large doses of caffeine—say 5 to 10 grains three or four times a day—lies in the nervousness and insomnia of which patients are apt to complain. Moreover, the system becomes speedily accustomed to its effect, necessitating the employment of increasing doses. For this and other reasons, Professor von Schroeder, of Strasburg, was led to experiment on animals with theobromine, and his results were reported at the Congress of Scientists, held in Heidelberg, September, 1889. He also had a paper on the subject in the *Therapeutische Monatshefte*, July, 1890. His conclusions were that theobromine is a powerful stimulant of the renal epithelium, and that this action is not preceded or accompanied by any effect upon the nervous system, as in the case of caffeine. At his suggestion a series of clinical investigations was undertaken by Dr. Christian Gram, in his hospital service at Copenhagen. They were reported in the *Therapeutische Monatshefte*, 1890, No. 1. Additional clinical studies were communicated by Dr. August Hoffmann to the Heidelberg Medical Society on July 1, 1890. Recently also Dr. Koritschoner, of Von Schrötter's clinic, at Vienna, has given the remedy a trial in thirty-eight cases of general dropsy. Twelve were due to renal disease, twenty were of cardiac origin, three from cirrhosis of the liver, two from tuberculosis of lungs and serous membranes, and one from hepatic cancer (see *Boston Medical and Surgical Journal*, October 30, 1890; also THERAPEUTIC GAZETTE, December 15, 1890). These observers are unanimous in praise of the remedy, and seem to regard it as without an equal. In the greater number of Gram's cases all other cardiac diuretics had been tried without avail, whereas the theobromine acted promptly and powerfully, except in a few instances, when it failed to be absorbed, or the renal epithelium was too greatly destroyed to respond to stimulation. Hoffmann's trials of it were confirmatory of Gram's.

The remedy acted promptly and energetically in all but five of Koritschoner's thirty-eight cases, and these were so far gone that death supervened a few hours after their admission to the hospital. Two cases of acute scarlatinal dropsy were benefited in a most gratifying manner, thus showing theobromine to be free from irritating effect upon the kidneys.

There are two objections to the employment of the alkaloid itself,—viz., its scarcity and consequent cost, and chiefly its almost absolute insolubility, even by the stomach. The latter difficulty was overcome by Dr. Gram, who found that, united with nearly an equal proportion of salicylate of sodium, it became readily soluble and easily absorbed. It is this salt—sodio-theobromine salicylate—that has received the appellation of diuretin.

The remedy is readily soluble in warm water, and had better be administered thus or in pill form, since, if exposed to the air, as in powders, it undergoes change, from a setting free of the alkaloid, thus being rendered insoluble. As the daily dosage is large,—from four to eight grammes (sixty to one hundred and twenty grains) in the twenty-four hours,—it is best given in divided doses, and therefore should be ordered in the strength of fifteen grains to the ounce of warm water, and of this a tablespoonful is taken every three or four hours. Its taste, which one patient likened to a weak solution of soft soap, may be disguised by the addition of some aromatic oil. It is well borne by the stomach apparently, as none of my patients have complained of discomfort following large and frequent doses.

In the *New York Medical Journal* for July 11, 1891, DR. ROBERT H. BABCOCK reports four cases of different forms of dropsy in which the administration of diuretin in the dosage above referred to produced entire removal of ascites and general dropsy, and which seemed to confirm the most enthusiastic statements which have already been published as to the diuretic properties of this drug. Dr. Babcock summarizes his conclusions derived from his experience with this remedy as follows:

1. Diuretin is a diuretic of great power and promptitude, suitable to all forms of dropsy.

2. Not increasing arterial tension, it is likely to succeed where digitalis, caffeine, and their congeners fail.

3. In cases of cardiac dropsy, with great feebleness of the pulse and arhythmia, it will strengthen and regulate, rather than depress, the heart's action.

4. It appears to cause no irritation of the stomach or kidneys.

5. It requires to be given to the extent of from ninety to one hundred and twenty grains daily, and preferably in small doses frequently repeated.

6. It is best administered either in solution in warm water or in gelatin-coated pills, since, if exposed to the air in powders, it undergoes change, with a precipitation of much of the insoluble theobromine.

THE NATURE AND ACTION OF THE ACTIVE PRINCIPLES OF TUBERCULIN.

Koch's remedy for tuberculosis is a glycerin extract of pure cultivations of the tubercle bacillus, the remarkable properties possessed by it, unfortunately for evil as well as for good, are, according to Koch, due to one active principle present in such small quantity as to constitute probably little more than a fraction of one per cent. of the whole. Numerous observers in their studies of this substance have found many points of divergence from the description of its action and properties published by Koch. One of the latest and most important of these criticisms was published in the *British Medical Journal* for July 25, 1891, by DR. WILLIAM HUNTER, who there gives a long account of his study of the chemical nature of tuberculin, with accounts of its action and properties. The following is a summary of his conclusions:

1. Tuberculin owes its activity not to one principle, but to at least three, and probably more, different substances.

2. Its action in producing local inflammation, fever, and general constitutional disturbance is not a simple but an extremely complex one.

3. Its active ingredients are of the nature of albumoses, alkaloidal substances, and extractives. The action of these is in certain instances antagonistic.

4. Its remedial and inflammatory actions are connected with the presence of certain of its albumoses, while its fever-producing properties are chiefly associated with substances of non-albuminous nature.

5. The albumoses are not lost by dialysis, the latter are. By the adoption of suitable methods it is thus possible to remove the substances which cause the fever, while retaining those which are beneficial in their action.

6. The fever produced by tuberculin is thus absolutely unessential to its remedial action.

7. The same holds true, the writer believes, with regard to the inflammation produced by it. Inflammation is certainly not absolutely necessary for the manifestation of its remedial action. It is in some cases, however, beneficial, and helps, under certain circumstances, the action of the remedial substance.

8. The difference between the substance which causes the inflammation and the one which possesses the remedial properties as regards their action is not merely one of degree. The local reaction which occurs with small doses of the former is much greater than that producible by large doses of the latter.

9. Nevertheless the remedial substance has as truly a local action as the one which tends to produce inflammation. This is evidenced in two ways,—first, by distinct and obvious shrinking of the tuberculous tissues; and, secondly, increased scaling, pointing to the existence of a certain amount of deep local congestion. In some cases this congestion becomes obvious by slight superficial reddening.

10. The power of favoring recurrence, which tuberculin possesses, is connected partly with the non-albuminous substances removable by dialysis, possibly also with a portion of the albumoses present.

11. The remedial substance resists the action of high temperatures. Its action is, however, lessened if exposed to a temperature above 70° C. in a dry condition. Its properties, moreover, can be altered in other ways, sometimes, for example, materially by dialysis. This change is not due to the passage of the substance through the membrane, but to changes occurring in it within the dialyzer. Its sensitiveness in this respect the author regards as one of its chief features, and causes its preparation to be attended with special difficulties.

12. Both it and the albumoses present probably belong to the class of proteids,—albuminous substances derived from the plasma of the bacilli themselves, and not merely formed by the action of these bacilli on the surrounding tissue.

THERAPEUTICS OF SYPHILIS.

DR. E. KREIS, of Zurich, says that, in spite of new methods and new remedies, we are still far from an ideal treatment of syphilis, one which will remove completely the syphilitic virus from the organism without injury.

He first discusses the so-called abortive treatment by excision of the chancre.

Neisser believes that it is possible to check the outbreak of syphilis by excising the chancre. Jullien's belief, based upon a series of experiences, is that syphilis may be delayed in its course, or at least weakened, by excising the chancre. In one of his cases the patient had a chancre removed in 1880; he remained under careful observation free from syphilis for four years, and then died of typhoid fever. Another patient, who was operated on in 1881, has remained healthy to the present day. A third patient became reinfected with syphilis seventeen months after the first primary sore had been excised. Leloir's first experience led him to declare excision of the chancre useless, but upon investigating the question afresh he obtained positive results. The following case is especially noteworthy: He excised a chancre in 1884, twenty-four days after the coitus in which infection had occurred. Subsequently there was slight cicatrization, with no induration, no swelling of the glands, and later no symptoms of syphilis. The very careful observation of this case extends to the year 1888. On the other hand, Neumann, Ricord, and Von Sigmond do not favor the method, and Ricord declares that the destruction of the primary sore is absolutely useless. Unna and Auspitz, however, have revived the treatment. Kreis thinks that at present we must conclude that excision of the chancre cannot abort syphilis. Nevertheless, he regards the operation not only justified, but indicated for certain cases,—if only to give a positive answer to the question and to adduce proof that the chancre is to be regarded as the local action of the infection and not as the expression of the general disease. The indications for the operation are: 1, absolute certainty of diagnosis; 2, operation as early as possible, before the lymphatic glands have been infected; 3, that the chancre should be typically formed and appear completely separated from the surrounding parts, so that it may be removed *in toto* without infecting the neighboring tissue.

A second question in dispute is as to the time when the general treatment of syphilis should begin,—whether with the occurrence of the primary sore, the so-called preventive treatment, or with the occurrence of the secondary symptoms. Fournier, Mauriac, Jullien, Schwimmer, and others hope, by early mercurial treatment of the patient, to prevent secondary symptoms; or, if these should set in, to make the course milder. Doutrelepont, Köbner, Kaposi, Unna, and Neisser, on the other hand, take the position that the primary treatment generally fails to defer the timely appearance of the secondary symptoms, and that the latter often occur more obstinately and severely. Kreis agrees with Neumann in opposing early treatment. He says he has seen after it extremely obstinate affections of the mucous membranes of the mouth, and the occurrence of the premature iritis, skin affections being absent. He thinks early treatment appropriate only for large chancres difficult to heal.

A third question of great importance is as to the most appropriate form and combination of mercury in the treatment of syphilis. Kreis concludes that mercurial ointment gives the greatest therapeutic effect with the least detriment. It may be employed as in the usual inunction "cure" or in the form of a soap containing metallic mercury, or in the form of a mull, as recommended by Unna. They are all only different methods of applying mercurial ointment, and are nearly uniform in their activity. The use of the *unguentum cinerei* represents the best, most active, and most permanent "cure."

How long should the mercurial treatment continue? Fournier especially has called attention to the fact that those cases which were not sufficiently treated, or which were treated for too short a time, were often followed by severe tertiary manifestations. He therefore thinks that the treatment of syphilis should be continued for at least three or four years; recently he has made the time still longer. Lang, Diday, Caspary, and Köbner combat the long-continued mercurial treatment, and maintain that such treatment leads to serious injury to the organism, both to the digestive organs and the central nervous system. Neisser is in favor of long-continued, but intermittent, treatment. Kreis regrets that we lack statistics of cases extending over a long time; these would give us the necessary light by which to decide the question. All cases, however, should not be treated according to the same plan.

He concludes that, though the present treatment of syphilis does not enable us to cure every syphilitic permanently, yet we can by proper treatment always get rid of the symptoms again. We must in most cases consider syphilis an absolutely curable disease, and always a relatively curable one (*correspondenzblatt für Schweizer Aerzte*, No. 5, 1891).—*Medical News*, July 18, 1891.

THE ACTION OF SOME RECENT HYPNOTICS ON DIGESTION.

Having observed that certain gastric diseases—such as distaste for food, flatulence, vomiting, and diarrhœa—occasionally follow the exhibition of chloralamide, paraldehyde, sulphonal, and urethan, DR. JOHN GORDON undertook a series of investigation to determine their action of digestion, and his results are published in the *British Medical Journal* for July 18, 1891.

These investigations, which, it must be observed, attempt to deal only with one of the phases of digestion, may help to throw some light on the action of the drugs on the ferment. It has to be remembered that they may have a further action on gastric secretion, and that the whole of the muscular and nervous mechanism of the stomach may be influenced directly or indirectly by them. At any rate, paraldehyde does not seem to interfere with digestion, because of its influence on the peptone-forming power of pepsin; for when employed both in large and small quantities, it distinctly accelerated the digestion of the fibrin.

To ascertain this, the method employed was that of Grützner, and consisted in preparing fresh fibrin from blood, which was carefully washed with cold water until the washings were free from blood color; the washed fibrin was then allowed to stain in a weak ammoniated solution of carmine for twenty-four or thirty-six hours; the stained fibrin was again washed in a slowly-running stream of cold water till the washings were colorless. The rate and amount of digestion were estimated by the liberation of color from the stained fibrin, and by its diminished bulk. Four test-tubes of equal size and shape were selected; No. 1, which was the control test-tube, as a rule, contained half a gramme of stained fibrin, two decigrammes of pepsin porci, two cubic centimetres of two per cent. hydrochloric acid, and fifteen cubic centimetres of water. The other three test-tubes contained, in addition to the preceding ingredients, varied and graduated quantities of the drug under observation. The fibrin was suspended in the test-tubes either loosely tied by silk threads or enclosed in small muslin bags. The set of test-tubes were then placed in an incubator, the temperature of which was kept as nearly as possible to that of normal body heat. The liberation of color and the bulk of fibrin were recorded from time to time.

His experiments show, as regards chloralamide, that—

1. Large quantities retarded the digestion of fibrin in the ratio of the quantity employed.

2. Small quantities, for example, up to .02 gramme, did not have any marked influence either in accelerating or in delaying the digestion of fibrin.

3. Putrefaction was not retarded by either large or small quantities.

In the case of paraldehyde—

a. Large quantities considerably accelerated the digestion of fibrin, and that the rate of this acceleration was distinctly in ratio with the quantity used.

b. Small quantities also increased, but to a less degree, the digestion of fibrin.

c. Putrefaction was presented by the larger quantities of paraldehyde, and was delayed by the smaller quantities.

Urethan.—The result of experiments, which were conducted in similar manner, showed that—

a. Strong solutions—that is, .5 gramme, .25 gramme, .175 gramme—delayed digestion; that the stronger the solution the greater was the delay.

b. Weak solutions—that is, one, two, and three milligrammes—neither delayed nor accelerated digestion.

c. Neither strong nor weak solutions retarded decomposition.

Sulphonal.—Similarly-conducted experiments showed that—

a. Strong solutions, saturated or half saturated, considerably delayed digestion, and that the stronger the solution the greater was the retardation.

b. Weak solutions—such as one-sixteenth or one-eighth of a saturated solution—had little effect either in accelerating or delaying digestion, but when a solution of one-fourth of a saturated solution was employed delay in digestion took place.

c. Strong or weak solutions had no marked effect in retarding putrefaction.

THE TREATMENT OF CHLOROSIS BY COPPER.

In an article upon this subject, LIEGEOIS (*Rev. Gén. de Clin. et de Thérap.*, January 7, 1891) reports the success obtained in the treatment of chlorosis by the administration of copper. The author has followed the method employed by Luton in the management of

tubercular disease by the same drug. The conclusions previously arrived at by Pecholier and Saint Pierre are referred to. These writers, from an experimental study with verdigris upon the lower animals, and from observations made on individuals working in the manufacture of this salt, affirmed (1) that a daily and slow absorption of the drug favors the development of corpulence; (2) that women employed in verdigris-works are not subject to chlorosis.

These conclusions, apparently thoroughly reliable, led Liegeois to try the remedy in the treatment of the malady in question. The results have been highly encouraging.

The drug was administered to thirty chlorotic, *not anæmic or pseudo-anæmic*, women, as in all of them the chlorotic disorder was pronounced. The author employed the aceto-phosphate of copper, in pill form, as recommended by Luton for tubercular cases. If the disease was accompanied by amenorrhœa, menorrhagia, or leucorrhœa, three-fourths to one and a half grains of newly-prepared powder of ergot were added to each pill. One or two pills were given twice daily before meals, and in the intervals fifty to thirty drops of the tincture of nux vomica were administered. At the end of the meal a teaspoonful of the syrup of mint, with medicinal hydrochloric acid, was ordered also. This constituted the whole treatment.

The patients followed this medication uninterruptedly for one, two, and three months, without evincing any deleterious effects. No nausea or vomiting, no gastralgia, or any exaggeration of a previously-existing chlorotic gastralgia, was ever noticed. In the course of the whole treatment there were taken 60, 90, 100, 150, and 200 pills of the aceto-phosphate of copper, according to the following prescription:

℞ Neutral acetate of copper, gr. ⅙;
Crystallized phosphate of sodium, gr. ¼;
Powder of licorice and glycerin, q.s.
Mix and make one pill.

—*Archives of Gynæcology*, August, 1891.

THE USE OF ACETANILIDE IN THE TREATMENT OF ACUTE AND CHRONIC BRONCHITIS.

If there is any one disease whose causation, it might be supposed, would not be attributed to the action of any specific organism, but clearly due to the action of cold, that disease would undoubtedly be catarrhal bronchitis, and yet in the *Lancet* for June 23, 1891, MR. E. F. GRÜN endeavors to prove that bronchitis is the direct outcome of infection by a specific organism. He writes that his attention was first drawn to the existence of this organism by the constancy with which he detected it in the sputum of individuals suffering from bronchitis, which he had examined to determine the absence or presence of the bacillus tuberculosis. He soon, he states, was able to satisfy himself as to the presence of the characteristic organism in every case of bronchitis which came under his notice. He then succeeded in isolating the organism by the gelatin-plate cultivation process, and he now describes the nature of the organism, the character of the experiments carried out in cultures and inoculations, and describes the substances which have been capable of destroying the organism within and without the body.

On examining the sputum of any case of acute bronchitis, the expectorated matter is found to consist of pure mucus, embedded in which are pus-cells, epithelial cells, leucocytes, and granular material of a highly-refracting nature, probably oily. In and among the pus-cells, upon the epithelial cells, and lying free in the mucus, are a number of bacteria. When not contaminated by secretions from the mouth these bacteria consist of one easily distinguishable species, constant in size, shape, and peculiarity of staining. This bacterium is a bacillus, in that its length is about twice its breadth, and from observation in cultivations appears to give off spores. Its length is very constantly about two micro-millimetres when met with in preparation from sputum. On cultivation, however, alterations take place in its morphological character, which will be subsequently described. The organism is constricted in the centre very like bacillus fluorescens. The two parts on either side of the constriction are rounded. The organism stains readily with gentian violet and methylene blue; it occurs singly, in pairs, and in clusters or zoogloœa, as before remarked, lying free, and in the substance of leucocytes, in many of which the organism can be seen, apparently causing some coagulation of the leucocyte protoplasm around it. Some leucocytes have more than one bacillus in their interior, a coagulation of the protoplasmic matter taking place around each bacillus and causing the leucocyte to split up, each surrounded bacillus forming a cell, impossible to distinguish from a pus-cell, and

ultimately losing itself in a granular degeneration. The leucocytes thus absorb a certain number of the bacilli; the absorbed bacilli cause a coagulation of the protoplasm of the leucocyte, and presently a granular destruction of the leucocyte. Upon epithelial cells the bacilli produce no change, but are simply collected in numbers upon the surface of the cell.

Organisms when mounted on cover glass, with a little gentian violet to color, exhibit active movements under one-twelfth of an inch. The movements seem to consist of contraction and expansion of organism; a mobile movement in varying directions; a swaying movement, one end of the organism being fixed; a twisting movement on the long axis of the organism, giving a screw-like outline to the organism. Cultures a month old exhibit the organism somewhat altered in character, and give rise to a suspicion that the culture might not be quite pure; but plate cultivation gave a reversion to the original form of organisms as seen in sputum and as seen in the tube cultures of twenty-four hours' growth. The alteration in form consisted in an increase in length of the organism and a loss of the characteristic central constriction in a large number of the individual bacilli of the thirty-day-old culture. The reaction of the scum produced is strongly alkaline.

Cultivation.—The organism grows readily upon nutrient gelatin and agar-agar, at a temperature between 5° C. and 40° C. A temperature above 40° C. retards growth; above 50° C. the organism is destroyed; while a temperature below 5° C. appears only to arrest the growth, for on the temperature being raised it resumes its growth with unimpaired vigor. The growth takes place upon the surface of the nutrient media as a flocculent film, but gradually penetrates the interior of the agar-agar nutrient. The surface of the medium upon which the organism grows gives a strong alkaline reaction; a gas of a sour and most offensive odor is given off. The growth is apparent twelve hours after inoculation of nutrient media. When grown upon nutrient gelatin the gelatin is liquefied.

One decigramme of each of the following substances was added to a tube of nutrient agar-agar and also to a tube of nutrient gelatin. The tubes were then inoculated from a subculture of the organism; other tubes were inoculated as control experiments, with the following results:

Iodoform	Free growth in 7 days.
Carbolic acid (¼ per cent.)	Free growth in 7 days.
Carbolic acid (1 per cent.)	Free growth in 10 days.
Carbolic acid (2 per cent.)	Free growth in 28 days.
Carbolic acid (10 per cent)	Free growth in 50 days.
Menthol	Free growth in 3 days.
Thymol	No growth.
Boric acid	Slight growth after 10 days.
Aniline chloride	Free growth in 4 days.
Acetanilide	No growth after 40 days.
Untreated tube	Free growth in 24 hours.
Liq. hydrargyri perchloridi	No growth after 60 days.

It was thus found that a free growth of the organism took place upon tubes of nutrient material to which iodoform, carbolic acid, menthol, and aniline chloride had been added in considerable quantity. But tubes to which acetanilide and liquor hydrargyri perchloridi had been added gave no growth even when kept for a long period. Of these agents capable of checking the growth, acetanilide alone was available for internal administration, and this agent appears to possess antiseptic powers equal almost to those of perchloride of mercury, while being perfectly innocuous, odorless, and tasteless. Further, when administered as an internal remedy, it appears to possess the power of cutting short acute catarrhal bronchitis in a striking and rapid manner, twenty-five consecutive cases being treated with the remedy with unvarying successful result in arresting the disease within comparatively a few hours. This statement, taken with the fact, which is open for any observer to test, as to the power of arresting bacterial growth in nutrient media, should lead to an extended trial of the remedy. To produce a beneficial effect doses of some magnitude must be given, such as 5 grains at alternate hours.

Mr. Grün then publishes notes of a few cases of bronchitis, in which it is stated that acetanilide not only relieved the cough, but that its administration also resulted in the disappearance of the organism, and he concludes from his experiments and clinical experience that bronchitis can no longer be regarded as a manifestation on the part of the bronchial tube of a simple chilling of the blood circulating in the capillaries of the skin, although there can be very little doubt that it is from this cause that cases of bronchitis arise in an indirect manner. No doubt the chilling of the blood causes an alteration of the conditions governing either the entrance of the bacteria into the bronchial tubes, or their destruction and elimination when entrance has been obtained by them into the lung. As an hypothesis we may as-

sume that possibly the cilia of the tubes act less readily after chilling, although this has not been proved at present as far as cilia within the body are concerned. Cilia without the body do certainly require some particular temperature, at present undetermined, but none the less certain, for the proper exercise of their powers; it may be that as the chilling is more or less intense, so do the organisms penetrate deeper into the lung tissue, and give rise to symptoms of greater or less gravity. Or there may be defective power of destruction of bacteria after chilling. From examination of sputum it appears probable that the presence of bacteria or other foreign substances, such as carbonaceous particles, attracts to the surface of the mucous membrane leucocytes, phagocytes, or other wandering forms of cell-life, which, under ordinary conditions, destroy in their own manner bacteria, or carry off solid inorganic particles incapable of destruction to parts less sensitive to their presence. When, however, the numbers of bacteria are very great, the exudation is for a time not sufficiently rapid to effect the necessary clearance of the irritating substance, and further help is required. Help gradually arrives, in many cases aided by poulticing and local stimulation, and presently the difficulty is overcome, or the individual succumbs in the effort.

MICROBICIDE PROPERTIES OF THE GASTRIC JUICE—MICROBES OF THE ALIMENTARY CANAL.

In an interesting paper in the *Vratch*, KIANOWSKI has taken up the subject of the microbes of the stomach and the effects of the gastric juice on them. To solve the question, he undertook a series of experiments on both sick and well persons. These experiments have given the following results: 1. The quantity of bacteria found in the contents of the stomach one hour after a meal is not so much in inverse relation with the acidity of the gastric juice and the quantity of hydrochloric acid therein as it is in direct relation with the amount and kinds of micro-organisms introduced with the food. 2. Within the limits of the mean acidity due to hydrochloric acid, the gastric juice systematically and completely kills the microbes in the stomach; the more prolonged the action of the gastric juice, the more microbes it kills. 3. There is a general relation between the augmentation of the general acidity due to the normal or abnormal properties of hydrochloric acid on the one hand, and the quantity of destroyed microbes on the other. 4. If the acidity of the gastric juice is feeble, the microbes multiply in the stomach. 5. Experiments on sick persons have shown that if their gastric juice contains a sufficient quantity of free hydrochloric acid, it possesses the same microbicide qualities as the gastric juice of healthy persons.

The conclusions of this important paper are: 1. In a state of fasting, the stomach of a man in good health contains a great many microbes. 2. The quantity of microbes existing in the stomach during the first hours of digestion is in direct relation with the quantity introduced with the food, drink, air, saliva, etc. 3. The gastric juice, and especially the hydrochloric acid, possesses most manifest microbicide properties. 4. The microbes probably take no active part in the processes of stomach digestion. 5. Persons who by reason of some disease secrete little hydrochloric acid, more easily become the victims of poisoning by microbes or their products introduced into the stomach. 6. It is not well in the morning to remain too long a time fasting, and during epidemics, such as cholera, it will not do to let the stomach become empty; the latter should always contain a certain quantity of food, and, if possible, sterilized food.

It will be seen that these views are foreign to those published several years ago by Bichamp, who referred the entero-digestive process to the action of certain microbes called by him microzymes. Bichamp's theories were purely speculative, being based on Pasteur's studies in fermentations; his pretended microzymes have not been seen by any other microscopist. The older chemical theory of digestion still holds its grounds.

VAN PUTEREN, in the *Deutsche Medizinal Zeitung*, reports the results of one hundred and twenty-seven experiments made upon forty children, the ages ranging between 3 and 77 days. Material for examination was obtained from the stomach by a sterilized Nélaton catheter, and examined biologically.

The proportion of bacteria in the stomach was found to be greatly increased whenever the tongue was coated or deposits existed in the mouth, these being conditions in which bacteria in the mouth were most abundant. The bacteria were much more numerous in infants fed on cow's milk than on those nursed at the breast.

Of especial interest are the results which he obtained after the mouth had been thoroughly

cleansed. In eighteen per cent. of the experiments made, *no bacteria* were obtained from the stomach of breast-fed children. In forty-one per cent. the proportion to the average number found in the stomach under other circumstances was as 1 to 130. In the cases in which bacteria were found to be absent from the stomach, the digestion was apparently perfect; hence the writer reaches the conclusion that bacteria have no essential physiological function in the infantile stomach.

This writer's experiments further show that the acidity of the stomach does not prevent bacterial growth. He made eight experiments to determine the acidity, and found it only .6 to .8 per cent., while Miller had shown that 1.6 per cent. acidity was necessary to inhibit bacterial growth.

It will be seen that these latter experiments hardly agree with those of Kianowski. Doubtless in healthy infants fed on unsterilized cow's milk, the action of the gastric juice is similar in its microbicide properties to that of adults that habitually eat unsterilized food. Such infants are more liable to microbe infection through the alimentary canal than infants fed on breast-milk. And it may well be conceived that the alimentary canal of the latter will be tolerably free from bacteria, especially if the mouth be kept clean.

The influence of bacteria in abnormal intestinal processes is awakening attention, and this whole subject has been investigated of late by Baginsky, Lesage, Escherich, and others. The bacteria found in summer diarrhœa are very numerous, but how far they are simple accompaniments and how far they are the causes of morbid changes is not yet definitely determined. Certain it is that there is everywhere great interest in maintaining intestinal antisepsis in all the summer complaints of children and adults, and the results of such antiseptic treatment are sufficiently encouraging.—*Boston Medical and Surgical Journal*, August 13, 1891.

TREATMENT OF GONORRHŒAL RHEUMATISM.

In a discussion on this subject at a meeting of the Paris Société de Dermatologie et Syphiligraphie on May 14, M. JULLIEN said that, having regard to the infectious origin of the disease, he had for the last five years systematically treated it with subcutaneous injections of bichloride of mercury with extremely satisfactory results.

M. E. BESNIER pointed out that joint-inflammations of gonorrhœal origin often spontaneously undergo rapid modifications, which made it very difficult to judge of the effect of particular remedies. In his experience local treatment was the most important therapeutic factor in such cases, and he placed most reliance on the method recommended by M. Lucas-Championnière, which consisted in touching the parts in a number of places with the point of the cautery, and then wrapping the joint in Vigo's mercurial plaster with cotton-wool dressing afterwards.

M. DU CASTEL said he had tried mercurial friction in one case without result, while in another case, in which, however, the inflammation was less severe, it had done a great deal of good.—*Boston Medical and Surgical Journal*, July 9, 1891.

THE TONGUE IN SCARLET FEVER.

In the *Deutsche Medizinal Zeitung* for August 6, 1891, DR. A. NEUMANN divides the modifications which occur in the mucous membrane of the tongue in scarlet fever into three stages.

First.—The swelling of the entire mucous membrane, with turgidity of the entire epithelium.

Second.—The stage of desquamation.

Third.—The regeneration of the lost epithelium.

From the fact that the mucous membrane of the tongue over the filiform papillæ loses its epithelium, and the fungiform papillæ thus become more prominent, the tongue in scarlet fever assumes its well-known characteristic resemblance to the strawberry or raspberry. Of forty-nine patients, in thirty-eight (seventy-nine per cent.) the characteristic scarlet fever tongue was well marked; while in four only one or the other of the three stages was faintly indicated. In these cases any detectable modification in the mucous membrane was entirely wanting, so that, therefore, the typical scarlet fever tongue was absent in twenty-four per cent. of the author's cases. As a rule, those disturbances of digestion are responsible for this state of affairs, for from this cause the mucous membrane of the tongue becomes so altered before the scarlet fever itself commences that any further alteration of the mucous membrane is impossible. In the majority of cases the cloudy epithelium of the mucous membrane and of the tongue had been fully separated within three to five days. Marked raspberry

tongue was noted in three cases on the first day, in five cases on the second day, in six cases on the third day, in four cases on the fourth day, and in twenty cases at a later date. It had disappeared on the seventh day in eleven cases. There is no relationship between the intensity of the scarlatinal process on the tongue and the intensity of the fever or the intensity of the cutaneous manifestations of the disease.

THE THERAPEUTICS OF THE SENILE HEART.

Dr. George W. Balfour (*Edin. Med. Journ.*, June, 1891) says that the senile heart is synonymous with the gouty heart, but that it must be remembered, in the first instance, that all affections of the heart found in the old are not necessary senile in origin, and he quotes the case of an old man who had had mitral incompetence for no less than sixty-two years at least. Another point to be remembered is that even when an existing affection of the heart is certainly senile in character in the sense of having come on primarily and insidiously after middle life, and possessing the ordinary characters of a heart strain from internal causes, the symptoms complained of do not always depend upon the heart affection, even when they seem to be distinctly cardiac in their nature. Anæmia from various causes, for example, loss of blood or malignant disease, may be the actual cause of the symptoms. Simple irritability is the earliest indication of advancing senility in the heart; uneasiness or actual pain localized to the heart region, fits of palpitation on any sudden exertion or emotion, tremor cordis coming on without warning,—these are the symptoms of cardiac failure based on malnutrition. The pulse may be small, soft, and compressible, and the blood tension low. All possible sources of loss of blood or of interference with blood making organs should be sought for, and removed when possible. Among such causes may be mentioned loss of blood from the nose or from piles, an insidious but persistent diarrhœa, or excessive venery. In regard to treatment, where the blood-pressure is low any natural or unnatural drains upon the system must be remedied; the amount and nature of the work done and the exercise usually taken must be so regulated as to be adapted to the needs of the system. But even more important than exercise is temperance, not only in drink, but more especially in regard to eating. Many senile affections of the heart owe their existence to over-indulgence, and all are undoubtedly aggravated by it. Cases of senile heart may be grouped for dietetic purposes under two distinct heads,—first, those who are over their normal weight, who are breathless with occasional irregularity of the heart, and with or without marked signs of cardiac dilatation; and, secondly, those who are at or below their normal weight, and who suffer very considerably from cardiac disturbances of various characters, also with or without very evident signs of dilatation of the heart. The first point of importance is to divide the day properly, so that there may be a sufficient interval between meals. In health the stomach empties itself usually three or four hours after a meal, and requires a rest before more food is ingested. We therefore get the following rules,—namely, 1, not less than five hours between two meals; 2, no solid food of any kind is to be taken between meals; 3, all invalids should have their most important meal in the middle of the day. A model dietary for a patient would be somewhat as follows: Breakfast at 8.30 A.M. Small slice of dry toast with butter, one soft-boiled egg, or a small quantity of fresh white fish, with a small cup of good coffee or tea, with cream, milk, or sugar, if required; cocoa, of course, may be substituted for the tea or coffee, and some patients prefer oatmeal porridge, but in that case they must give up the beverages mentioned. Dinner at 1.30 or 2 P.M., to consist of fish, meat, and pudding, any two being taken. After a time any kind of fish and any kind of meat may be eaten in moderation, but at first the choice should be restricted to white fish boiled in milk, sweet-breads, chicken, game, rabbit, or tripe; any form of milk-pudding with stewed fruit may be allowed, but soup, pastry, pickles, and cheese are absolutely prohibited; one vegetable may be given,—namely, potato; spinach, tomatoes, onions, leeks, or celery, peas and beans must only be used sparingly; all other kinds are absolutely prohibited. A single cup of tea (or, better still, hot water) may be allowed at four or five o'clock, but not a morsel of anything to eat then. At 7 P.M. comes the final meal, consisting of a little white fish and potato, a bit of milk-pudding, porridge and milk, or cold bread with hot milk poured over it. At bedtime a small cupful of hot water will sooth the stomach, promote sleep, and pave the way for a comfortable breakfast the next morning. Alcohol should, if possible,

be entirely dispensed with; there is no more potent cause of cardiac dilatation than the abuse of spirits, and no more certain obstacle to the rehabilitation of such a heart than the excessive use of them. If old habits are too strong, a little light claret or a light white hock should be given with the mid-day meal, or a little well-diluted whiskey. Tobacco should be absolutely given up, or its use reduced to a minimum. As regards drugs, it must be remembered that all varieties of the senile heart are forms of failure with complications. The treatment must be tonic, and digitalis is the chief and most thoroughly reliable cardiac tonic. Where any drug can act at all it will never fail; it should be employed in doses of 10 minims of the tincture in the twenty-four hours, or at most in the twelve hours. Nativelle's granules form an elegant and efficacious preparation; the dose should not exceed 1 granule in the twenty-four hours. The object of using digitalis in the senile heart is not to remove dropsy to slow the pulse or to contract the heart, but by the gradual accumulation of trifling advantages to tone up, strengthen, and improve the nutrition of the cardiac muscle. Strophanthus cannot rank with digitalis, except that a solution for hypodermic use is much more possible. Strychnine and arsenic are both very useful in the treatment of the senile heart, and, in lesser degree, the protosalts of iron. For relieving spasm and lowering blood-pressure, the nitrites, and especially nitroglycerin, have no equal. Iodide of potassium and colchicum are indicated where the gouty nature of the affection is very pronounced, while for acting on the bowels rhubarb and soda, or the compound colocynth pill, are to be preferred.—*British Medical Journal*, July 11, 1891.

ERGOT AS A HÆMOSTYPTIC TINCTURE.

DR. FRITSCH (*La Pratique Médicale*, June 30, 1891) writes that he employs ergot but little in his obstetric practice in comparison to his large use of this drug in gynæcology. He employs ergot in pills, employing gum arabic as an excipient; but when he wishes to obtain prompt effects he prescribes ergot in the form of a tincture composed of powdered ergot, 20 parts, alcohol, 20 grains; and 500 parts of warm water, the bulk being reduced by boiling to 200 parts. He found, however, that this tincture soon produced gastric disturbance, and he finally substituted for it Danzel's ergotin, seventy-five grains each of ergotin being made into one hundred pills. All these pills were to be taken in the course of a day. He found that this mode of administration of ergot might be continued for months without producing any serious inconvenience, and always with the most satisfactory results. In cases of congestion, dysmenorrhœa, and in menorrhagia, Dr. Fritsch states that he has obtained good results from the use of a mixture containing forty-five grains each of hydrastis canadensis, extract of gossypium, and ergotin, made into one hundred pills, of which three may be taken in the course of a day.

NAPHTHALENE AS A VERMIFUGE.

In the *Mercredi Médical* for May 20, DR. MIROVITCH, of Biélsk, speaks of naphthalene as the best agent for expelling tænia. In his opinion it is superior to all other remedies, because of the certainty of its action and the absence of all toxic effect, for it is absorbed in but very minute amount by the gastro-intestinal mucous membrane. The dose for adults is 15 grains, given when the stomach is empty, and followed immediately by two tablespoonfuls of castor oil. Children may take from 4 to 8 grains, and at the same time a tablespoonful of castor oil flavored with a few drops of essence of bergamot. During the two days preceding the administration of the drug the patient is to eat freely of salted, acid, and spiced foods. Dr. Mirovitch states that in all his cases one dose of naphthalene was sufficient to expel the tape-worm, the head included, even in cases in which other drugs had failed. He has also found the drug most effective in the treatment of patients with escarides.—*New York Medical Journal*, August 15, 1891.

THE TREATMENT OF ENDOMETRITIS BY PENCILS OF SULPHATE OF COPPER.

At the meeting of the Académie de Médecine, held August 4, 1891, DR. DUMONTPALLIER described his method of treating endometritis, which consists in introducing, and then allowing to remain in the uterus, a pencil composed of 1 part of sulphate of copper and 1 part of rye flour (*La France Médicale*, August 1, 1891). The pencil should have the same length as the cervical uterine canal, and should contain seven and a half grains of copper. This is, according to the author, suf-

ficient to produce superficial cauterization of the mucous membrane, from the fact that it remains in the uterine cavity for several hours. The sulphate of copper penetrates to the glandular cul-de-sacs, where it completely destroys all septic elements; in fact, as soon as the pencil is introduced, it becomes softened by the intrauterine liquids, the uterus, contracting upon the foreign body, spreads the substance over the entire uterine surface. Scarcely any pain is produced by the sulphate of copper, although in three or four per cent. of the cases the application of the pencil of sulphate of copper may produce slight transient perimetritis. In no case, the author states, has he ever noticed any atresia of the cervico-uterine canal. The author maintains that a single application has been in his hands sufficient to cure sixty per cent. of his cases, and that the facility of application, the absence of all complication, whether immediate or remote, the short duration of treatment, and the persistence of cure are marked advantages of this system of treatment. Only when the sulphate of copper employed in this way fails is it necessary to resort to chloride of zinc.

CHLORALAMIDE IN SURGERY.

Frequently after an operation of magnitude it is necessary to give the patient something to quiet the nervous system and to produce sleep. It is not always pain which causes restlessness and sleeplessness after the operation; in the majority of cases I am sure that the impression upon the nervous system, and particularly upon the mind, is what leads to insomnia, for under our antiseptic methods, and especially where the wound has been covered with iodoform,—a drug having decided anæsthetic properties,—there is but a trifling amount of pain, often none, even after the most severe operative procedures. But as night draws near there is a growing restlessness, and at the hour when sleep should come the patient is anxious, nervous, and wakeful. What can be done? The most universal rule among surgeons is to order a hypodermic injection of morphine; but this is unjustifiable unless there be some indication for the anodyne effect of the opiate. This is markedly true in abdominal surgery, but in any case the morphine is objectionable because it is apt to produce vomiting; is certain to seriously interfere with the process of digestion; is sure to induce constipation, and nearly always to give rise to headache, malaise, etc. Chloral has been suggested as a proper hypnotic, but chloral depresses the heart to a dangerous degree, and therefore cannot be used in these cases. Bromides, with hyoscyamus, will sometimes answer the purpose admirably, but most stomachs rebel against this combination, so that it is hardly safe to try it. What, then, can we use? If a drug can be found which will be free from all these objectionable features it unquestionably will fill an important place in our materia medica.

Such a one, according to DR. LANPHEAR (*Denver Medical Times*, August, 1891), has been discovered in chloralamide. This comparatively new medicinal agent is prepared by combination of 2 parts of chloral hydrate with 1 of formamide; it is found in commerce as a colorless, crystalline substance, nearly tasteless, soluble in about 20 parts of water and 2 of alcohol. It will keep indefinitely in solution without decomposition, but cannot be dissolved in hot solutions because of chemical changes. It acts very much like chloral and sulphonal, but does not depress the heart like the former, and is much superior to the latter, in that it is soluble, exerts no bad influence upon digestion, possesses no diuretic action, never causes pruritus, vertigo, diarrhœa, or other bad symptoms which sometimes follow the administration of sulphonal; in fact, experience is demonstrating the accuracy of Reichmann's observation: From chloralamide no ill effects in the circulation or in the feelings of the patient are to be noted; and, besides, the cost is much less than that of sulphonal. T. Lauder Brunton, in a recent report on the relative utility of different hypnotics, highly commends it, and states that with reference to certainty of action and the question of tolerance, chloralamide surpasses.

It exerts its influence upon the brain and spinal cord, producing sleep and reducing the motor excitement; it may be regarded as a pure hypnotic without anodyne properties, though some late reports would indicate that it has to some degree the power for partial abolition of pain. It is, then, the ideal sedative, giving prompt and satisfactory action, reliable results, and absolute freedom from evil side- or after-effect.

Its dose is from 15 to 60 grains. The proper method of exhibition is to give 15 to 30 grains (according to the condition of the subject), repeating the dose in an hour if the first have not produced sleep. Usually from

10 to 30 grains gave five to eight hours' refreshing slumber. The best method of giving it is to dissolve the required amount in about a teaspoonful of whiskey or brandy, or in a small glass of wine, if the patient prefer. It may also be given in anything containing alcohol in considerable quantities, as tincture cardamom compound, tincture of hyoscyamus, etc. If, for any reason, it cannot be given in this manner, it may be taken in powder form, and washed down with cold water or cold tea. The direction of W. Hale White, of London, is a good one,—viz., tell the patient to dissolve the powder in brandy and water, to his liking, and drink it shortly before going to bed; this combination with spirits is particularly good in our surgical cases where whiskey is usually indicated, at least in most major operations. If in any case it be better to have the medicine in liquid form, this combination may be prescribed:

℞ Chloralamide, ʒii;
Spts. frumenti, fʒi;
Misce bene ut ft. solut. et adde
Syrupi rubi idæi, fʒi. M.

Sig.—One tablespoonful, to be repeated in one hour if sleep is not produced. This makes a decidedly pleasant mixture of slightly acid taste and fruity aroma and flavor.

AN ICHTHYOL VARNISH.

UNNA (*Monatshefte für Prakt. Dermatologie*, Bd. xii. No. 2, 1891) has for some time felt the desirability of having a solution of ichthyol of considerable strength which would dry rapidly, would not irritate the skin, and would be soluble in water. After numerous experiments, he has found the following formulæ to fulfil all indications. In the preparation of the paste, some substance was needed to prevent the starch from being precipitated, and a solution of albumen made concentrated by gentle heat effectually hinders this deposition:

℞ Ichthyol, 40;
Starch, 40;
Solution of albumen, 1 to 1½;
Water, to 100.

The constituents must be incorporated in this order: First, the starch is to be uniformly moistened with the water; then the ichthyol thoroughly rubbed in; and, finally, the solution of albumen mixed with the others. The other varnish is somewhat different. In it carbolic acid replaces the albumen:

℞ Ichthyol, 25;
Carbolic acid, 2.5;
Starch, 50;
Water, 22.5.

The ichthyol and carbolic acid are dissolved in the water by aid of heat, and with this an equal amount of starch is slowly rubbed up. These varnishes, when smeared on the skin, as on an acne, an acne rosacea, or a lupus erythematosus, dry in course of two minutes, and can be easily washed off without any irritation from friction. Thus they are preferable to the ichthyol collodion, being only inferior to it, inasmuch as they do not exercise the same amount of compression which it does. They are, like it, not readily removed by the perspiration, as the zinc ichthyol jelly is apt to be, while they cause no soiling of the bed linen. They are likely to come into extensive use.—*Edinburgh Medical Journal*, July, 1891.

TREATMENT OF EPILEPSY BY THE CONJOINED EMPLOYMENT OF BROMIDE OF POTASSIUM AND OF AN AGENT CAPABLE OF RENDERING THE NERVOUS CENTRES ANÆMIC.

Under this head, POULET, of Plancher-les-Mines, in the last *Bulletin Général de Thérapeutique*, writes of a combination of bromide of potassium with Calabar bean, which has given him success in the treatment of obstinate cases of epilepsy where the bromides alone had failed. A favorite formula of his is the following:

℞ Bromide of potassium, 100 parts;
Tincture of Calabar bean, 35 parts;
Water, 470 parts.

Sig.—A tablespoonful, to be increased to a tablespoonful and a half, then two tablespoonfuls, daily.

A tablespoonful contains 3¾ grammes (or about 57 grains) of bromide and 1.08 grammes of the tincture. The medicine may be given in divided doses instead of in one full dose, half a teaspoonful being given at first twice, then three times, then four times, a day.

Poulet reports five obstinate cases treated in this manner. These were cases where bromide alone failed to cure.

In No. 1 the fits were formally six or eight a week (*grand mal*). After a year of the new treatment, no return of the epilepsy. In this patient the tincture of Calabar bean is occasionally replaced by eserine, in the dose of one milligramme to each gramme of bromide; the result has been the same. No

contraction of the pupil has been observed during the administration of the medicine.

No. 2, a most obstinate case, had been epileptic for eight years. Eight or ten fits a day. Failure of bromides, given alone, also of bromides and picrotoxine. Definitive cure under bromides associated with tincture of Calabar bean.

No. 3 was also a case of chronic, inveterate epilepsy. Several months' treatment by the combination above specified has given exemption from all convulsive accidents.

No. 4 was a case of grave epilepsy at the menopause. Frequent daily vertiginous attacks, ending in convulsions and stupor. At first the disease was successfully combated by bromide of potassium associated with picrotoxine; this combination afterwards failing, sulphate of atropine was substituted for the picrotoxine (six grammes of bromide of potassium, one milligramme of atropine, daily). The latter treatment has been kept up for a year, with complete cessation of the vertigo.

No. 5 was a case of cardiac epilepsy. The *grand mal* attacks were followed by hemiplegia, with stupor and hebetude (*état de mal*). A combination of bromide and digitalis caused disappearance of the epilepsy (eight grammes of bromide, associated with two grammes of tincture of digitalis in divided doses, daily).

Poulet terminates his article by the following conclusions:

The bromides remain the sheet anchor in the treatment of epilepsy, and by the term *bromides* we have especial reference to the bromide of potassium, which alone is truly efficacious.

There are, however, a great many epileptics whose attacks are only mitigated or postponed, not completely suppressed, by bromide of potassium.

In such cases, if we associate the bromide with some medicament which possesses properties identical with those of the bromide,—that is, being capable of anæmiating and decongesting the nerve-centres and paralyzing the system of voluntary muscles,—we generally obtain results which are perfectly satisfactory in essential epilepsy, and even in partial or Jacksonian epilepsy, on condition that, in the latter, we begin by the specific treatment of the determining cause. The substances that have been the most successful are Calabar bean, picrotoxine, and belladonna. In chronic epilepsy, digitalis must be added.

We may indifferently substitute sulphate of eserine for the preparations of Calabar bean, sulphate of atropine for those of belladonna, and digitalin for digitalis.—*Boston Medical and Surgical Journal*, July 30, 1891.

CHLORALCARBAMIDE.

When 165.5 parts of the hydrate of trichloraldehyde are mixed in a porcelain mortar with 60 parts of carbamide, the mixture liquefies, and remains in the form of a clear, oily fluid. On dissolving this substance in three times its quantity of water warmed to 60°, and then allowing the mixture to cool, a crystalline mass is obtained, which has been called chloralcarbamide, and which dissolves readily in warm water and in alcohol, and less readily in warm alcohol. According to the experiments made by PROFESSOR KOBERT, though possessing hypnotic properties, as is the case with all the derivatives of chloral, it is not yet suitable for employment, as its effects are too feeble and too slow in being produced. —*Revue Internationale de Bibliographie*, July 25, 1891.

THE ETIOLOGY OF PHTHISIS.

In the Section of Medicine of the British Medical Association, at its recent meeting at Bournemouth, DR. P. H. PYE-SMITH delivered an address on the "Etiology of Phthisis," of which the following is an epitome (*Lancet*, August 1, 1891).

He said he was sure that the cause of phthisis was a fit subject of discussion, because it is still unknown. But it might be asked, Is not the cause of phthisis known? Have we not the bacillus tubercle? and is not phthisis an infectious disease like syphilis or typhus fever? Accepting both these statements, yet the true etiology of phthisis was not known. On what basis did they rest? What were the criteria of a pathogenic organism? 1. There must be a specific microbe, clearly identified not only by its size, shape, and reaction to staining agents, but also by its development and propagation. Till this was ascertained, it was idle to discuss the claims of a microbe to be pathogenic. 2. The disease must be equally definable either by its anatomical characters or by a characteristic and unvariable course, or by "breeding true." For the present purpose, phthisis might be defined as a chronic disease, with no typical limitation of its

course, affecting the apices of both lungs and travelling downward, always tuberculous, always caseating, always pneumonic, and almost always more or less fibroid, ulcerative, excavating, and destructive, but also with great capacity of healing and involution, accompanied locally by pleurisy, bronchitis, and lobular pneumonia, accompanied also by general anæmia, dyspepsia, wasting, and pyrexia, with tuberculous affections of the larynx, ileum, and other organs. 3. The microbe must be present and demonstrable in every case of the disease. 4. It must not be present when the disease is absent. 5. When isolated by appropriate cultivation it must be capable, on introduction into a living organism, of reproducing, first, its own progeny, and, secondly, the characteristic symptoms of the disease. All these stringent requirements had been satisfied by the bacillus which the genius of Professor Koch discovered,—would he had been content with the discovery! Must it, therefore, be concluded that phthisis is produced by contagion, as surely and exclusively as syphilis or measles? It was reasonable to expect in the case of phthisis that, admitting the necessary invasion of the specific bacillus, there should be predisposing causes to favor its reception, without which it is perhaps powerless; and this was in full accordance with the vast experience accumulated since medicine was first studied. Experiments had proved that tuberculosis might be produced by inoculation of a pure cultivation of the microbe under the skin, or into the great lymph space of the peritoneum; also that the contagium might be injected as spray or dust into the trachea, or be administered in food, with success. In human beings, probably the most frequent vehicle of the contagium was dried-up sputum, and that it was carried in the respiratory air to the stomata of the air-vesicles. As a liquid it might also be conveyed in milk from tuberculous cows to the alimentary canal, and perhaps in other ways; and, as a solid, in the flesh of tuberculous animals. But why were the latter methods so rare, except in the case of children? Why did not infection occur through open sores or wounds, as in the case of pyæmia? Why was not lupus generalized? What, again, determined whether the contagion should be taken up from the lymph-spaces and conveyed to the lymph area, or absorbed by the veins and carried into the general circulation? As to the conditions that made the access of the bacillus dangerous, they might be divided for convenience into local and general, or constitutional; but probably the latter were only effective in so far as they modified the nutrition, circulation, or function of the lungs or other organ to which the microbe gained access. The purely local conditions might be thus suggested for discussion: "Pulmonary catarrh,—not bronchitis affecting the tubes lined with ciliated epithelium, but the form of 'pneumonia' which affects the intralobular passages and ultimately the air-sacs; not lobar and fibrinous, but lobular and catarrhal inflammation. How far is this condition a necessary antecedent? Does phthisis ever follow hepatization, or bronchitis, or emphysema? What relation is there between pleurisy and phthisis? Does phthisis ever begin without preliminary catarrh,—that is, do the bacilli themselves, mechanically or by their chemical products, act as irritants on a healthy lung and produce the soil suitable to their future growth? Is the pulmonary catarrh which follows measles more apt to end in phthisis than any other, or that which is often a sequela of whooping-cough? Again, are the various forms of pneumo-coniosis,—potters', miners', grinders', iron-workers' phthisis,—all of them tuberculous? If so, must we assume that when pulmonary catarrh is severe and protracted it always becomes the seat of tuberculous affection? in other words, is the bacillus of tubercle practically ubiquitous in cities and workshops? Does the influence of cold, damp dwellings and undrained soil—which the late Dr. Bowditch in New England and Dr. Buchanan in our own country have demonstrated—depend on the frequency of pulmonary catarrh to which these conditions give rise? Then, as to cases of phthisis following traumatic or idiopathic hemorrhage? Does a healthy lung ever bleed? and does pulmonary hemorrhage lead to catarrhal pneumonia, tuberculous infection, and caseous degeneration and ulceration? or is hæmoptysis only the first symptom, and never the first event, in the case of pulmonary phthisis? If hæmoptysis is a cause of phthisis, why does no tuberculous disease supervene on hemorrhage from the lungs of cardiac origin? Does a wound of the lung or injury of the chest lead to phthisis, whether by causing hemorrhage or inflammation? Was this the explanation of the classical instance recorded by Herodotus (lib. vii., cap. 88), or was the fall and the subsequent phthisis a mere coincidence? Do the bacilli act as mechanical irritants, or do they poison the tissues with their excreta?

In either case, do they set up pulmonary catarrh, or do they find it? Of general predisposition, can either anæmia, starvation, drink, or bad ventilation, syphilis, or diabetes be regarded as causes of phthisis; or can their action be explained as either favoring lung catarrh, or providing ready access of abundant bacilli to catarrhal lungs? How shall we meet the undoubted fact of hereditary consumption? Is it not more frequent than the chance incidence of a very common malady will explain? How many cases may be due to direct contagion, as from mother to child, or from one child to another? How many can be fairly attributed to common habitation, trade, food, or habits? In strictly hereditary cases, is it special susceptibility to the poisonous products of bacilli, or tendency to pulmonary catarrh, or vulnerability of the tissues generally which is transmitted. What is the true relation of pregnancy and childbearing to consumption? Is phthisis ever congenital; and if not, at what age may it first appear? Again, are we to look on the very important symptoms of derangement of the digestive organs—the not infrequent initial vomiting, the early dyspepsia, anæmia, and wasting, which often precede the cough and physical signs of pulmonary disease—as due, like the pyrexia of phthisis, to the effects of bacillary infection, or are they in any cases to be regarded as predisposing causes? To pass rapidly on to another group of concurrent causes of phthisis, is the traditional phthinoid chest the precursor of future or the effect of present disease of the lungs? The same question applies to the *ungues aduncí*, and to the general build or *habitus* of the body, which has been supposed to denote the tuberculous predisposition or diathesis. Does curvature of the spine or rickets lead to phthisis? Does caries of the bones or tuberculous disease of the joints or lymph-glands, or lupus, or leprosy, and if so, how and under what conditions? What are the facts as to the liability of the two sexes and of different ages? and do they throw any light on the etiology of phthisis? What are the facts of geographical distribution, and how do they affect the theories of contagion, of pulmonary inflammation, and of general vulnerability? What animals are most liable to tuberculous disease of the lungs, and to what causes may we ascribe the almost complete freedom of some and the equally marked proclivity of others? Lastly, we may inquire whether there are any natural prophylactics of phthisis,—ventilation, cold, heat, particular kinds of food, or special diseases, such as gout, cancer, and valvular disease of the heart?

Correspondence.

BERLIN.

(From our Special Correspondent.)

The Carcinoma Question—A Sensational Paper—The Latest Consumption Cure—Restrictions to Hypnotism—Heligoland, the New Zoological Station—A Clerical Polyclinic.

The verdict which the Prussian Minister of Cult has given in reference to the sensational charges of malpractice on carcinomatous patients, advanced against Professors von Bergmann and Hahn, has been exceedingly gratifying to the entire profession. Instead of being censured or punished, the two famous surgeons have earned praise and encouragement from the government for their valuable researches in the service of suffering mankind.

The subject of the curability of cancer is now the predominating topic of the day. It must be admitted that a change has taken place in the opinion of the profession as to the curability of this malady. I remember that about ten years ago a world-renowned surgeon declared that cancer was not only incurable but would ever remain so. At present in authoritative medical circles the view is gradually gaining ground that carcinomatous affections may eventually become controllable by the combined efforts of bacteriological research and surgical skill. The pertinent investigations of Professor Adamkiewicz, of Cracow, have attracted the attention of the entire medical world and also of the various governments, while the Berlin Faculty has as yet taken no definite stand in the matter. Professor Billroth, of Vienna, has not refrained from expressing his views on the carcinoma question. In a lecture delivered last week before a private class of physicians the nestor of surgery made the following statement: "Gentlemen, I no longer believe in the incurability of cancer, but regard the affection as controllable if its specific causal agency could be isolated." As Professor Adamkiewicz, in his latest communication, claims to have accomplished this isolation, we are justified in entertaining hopes regarding the therapeutics of cancer.

A sensational paper relating to the cure of cancer has just been published by Dr. Severin Robinski, of Berlin. The best part of Robinski's pamphlet is its title, which reads: "THE

CURE OF CANCER based on Personal Researches." The author's views of the etiology of cancer are sufficient to stamp the entire work as worthless. Dr. Robinski, like old Rip Van Winkle, has been asleep a hundred years or more. He speaks of humors and bodily juices just as the old writers were accustomed to, and preaches the doctrine of the constitutional character of cancer. Allow me to quote here a sentence of Robinski's paper: "The initiation of cancer is produced by a chemical alteration of the juices circulating in the lymphatic channels, and a subsequent morbid impression made on the anatomical elements. Persisting pressure, a blow, or a chemical irritation bring about the outbreak of the affection." It is needless to refute Robinski's etiological views of cancer. All rational observers and physicians to-day believe in the strictly local character of cancer, which becomes constitutional later on after implication of the lymphatic system and the infection of neighboring organs. I know of a patient who presented himself for treatment in the Charité for a little tumor of the lip. The growth was, after microscopical examination, diagnosticated as cancer, and excised. The patient has not shown any constitutional implication for years, which, according to Robinski's theory, would have been inevitable.

The treatment of cancer proposed by Robinski is not only useless, but even harmful. Cancer is often curable if operated for sufficiently early. Hence it is losing precious time to await the action of internal remedies, such as advocated by Robinski. These are by no means new medicaments, but our old friends acetate of potassium (5 in 250 of water, a tablespoonful *ter die*), or, if this should prove inefficacious, chlorate of potassium (1.5), together with iodide of potassium (.5 in 200 of water, a tablespoonful *ter die*). I am afraid that Dr. Robinski will not earn the title of benefactor of mankind by his cancer cures.

Knowing that you expect to hear in each of my monthly letters of a new consumption cure I shall duly register here the latest. This time the new cure hails from Italy, and the doctor's name who is longing for fame is Tacchini, from Casate-Nuovo. Tacchini's great remedy is still a dark secret to all outsiders. All that has thus far been divulged is that the remedy enters the system by inhalation. Tacchini is less unpretentious than Koch, and declares that, as proven in a number of cases, his treatment is successful, even in the third stage of consumption. I believe it is indicated to ask Dr. Tacchini to keep his secret for himself.

The government is preparing a bill containing restrictions and heavy fines against the illegal or unwarranted exhibition of hypnotism. Last week Dr. Sandmaur, of Münsterberg, was tried for maltreatment, consisting in a senseless application of hypnotism. Dr. Sandmaur had hypnotized a patient, a workingman, 20 years of age, for nine days daily, and on the last day four times. The result was nervous hyperexcitation, terminating in mania. The doctor was fined four hundred and thirty marks.

The German government is steadily on the lookout to increase the chances of scientific research. Heligoland, the latest peaceful conquest of Germany, will be made a chief station for biological investigations. This is all the more to be welcomed, as England, the prior mistress of Heligoland, has in no way utilized the favorable location of the island for the study of sea-life. This is the first German zoological station maintained by the government, for the station of Professor Dohrn, at Naples, is a private one, and is merely subsidized by the Prussian state. It will interest you to learn that, in conjunction with the zoological station, a museum of natural history will be fitted up by an amateur biologist, Mr. Gaetke, a government clerk, who for years has been gathering birds on the island. His collection is said to be the finest in the German empire.

The exhibition of the holy garment (the alleged unstitched coat of the Saviour) at Treves, Rhenish Prussia, which was opened to-day under tremendous clerical pomp and circumstance, marks the millennium of suffering humanity. From all quarters of the empire patients, rich and poor, flock to the "Prussian Rome," trusting to be relieved by viewing or touching the holy garment. The archbishop, Corum, has ordained that patients desiring to be cured by the holy garment must come provided with a doctor's certificate as to the nature of the malady and the necessary funds to pay for medical services. All that can be said about this new polyclinic is, "O sancta simplicitas!"

BERLIN, August 21, 1891.

INCOMPATIBILITY OF ANTIPYRIN AND TANNIC ACID.

To the Editor of the THERAPEUTIC GAZETTE:

DEAR SIR:—Some time since I had occasion to give a dose of antipyrin, for its anodyne effect, at the same time that I was giving

a solution containing fluid extract of ergot and tannin. Thinking to save trouble by giving both doses at once, I dropped the powder of antipyrin into a wineglass containing the solution, and began to stir. Immediately the solution turned to a milky whiteness, and a black, waxy material formed in it in considerable quantity. Of course I did not give it, and upon my return to my office at once set to work to discover wherein lay the incompatibility.

I made a simple solution of tannin, about gr. x to aq. dest. ʒii, and then added gr. viii to x of antipyrin. The milky appearance developed at once, and, upon stirring it with a spatula, the waxy substance also formed as before, but this time it was of a light color, more of the color of tannin, and I concluded that the intensely black color it had the first time was due to the ergot. I collected it on the spatula without any trouble, and working it between my thumb and fingers, found that it would not stick, but could be drawn out in long strings, exactly like molasses candy, the "pulling" of which is such a treat for children. Pulling it in this way, the wax had a delicate, silvery, glistening appearance that was very peculiar. I would like some chemist to tell me the chemical change that takes place in its formation, and its probable effects if administered to a person, also whether or not this incompatibility was already known.

I have frequently noticed statements of the incompatibility of antipyrin with various substances, but never with tannic acid.

WALTER P. ELLIS, M.D.

LIVERMORE, KY.

[According to Millard and Campbell (*Medical Record*, August 8, 1891) the following substances produce precipitates when added to aqueous solutions of antipyrin: Carbolic acid in saturated solution, tannin (a white insoluble precipitate), mercuric chloride (a white precipitate, soluble in an excess of water), infusion catechu, infusion cinchona bark, infusion rose leaves, infusion uva ursi, solution of extract cinchona bark, tincture catechu, tincture cinchona, tincture hamamelis, tincture iodine (a precipitate soluble in water), tincture kino, tincture rhubarb. The following substances produce coloration when added to aqueous solutions of antipyrin: Hydrocyanic acid, dilute solution, yellow; nitric acid, dilute solution, weak yellow; ammonium alum, dilute solution, dark yellow; amyl-nitrite, acid solution, green; nitrous ether, alcoholic solution, green; copper sulphate, green; ferrous sulphate, yellow brown; ferric sulphate, blood red; ferric chloride, blood red; syrup iodide iron, red brown.]

MORPHINE-POISONING—RECOVERY AFTER THE INGESTION OF ELEVEN GRAINS.

To the Editor of the THERAPEUTIC GAZETTE:

DEAR SIR:—The following case may prove of interest to some of your readers:

Miss E. C., aged 19, purchased forty-eight (four dozen) ¼-grain pills of sulphate of morphine at 2.30 P.M. August 3, and immediately swallowed forty-five of them with suicidal intent.

Friends noticed her comatose condition at 5.30 P.M., and summoned medical assistance. The physician who responded administered mustard-water, and secured pretty free emesis. He probably also administered atropine, but in what dose is not known. Coma deepened, respiration became greatly embarrassed, and the radial pulse became imperceptible. The attending physician pronounced the case a hopeless one, and prognosticated death within thirty minutes to one hour. He left the house at 2 A.M., and at 4 A.M. I was summoned, as the other physician's prognosis had not been verified. At this time the extremities were very cold, wrist pulseless, respiration 6 to the minute, and greatly embarrassed by mucus. Heart very weak,—130 to the minute. Surface cyanosed, pupils only partly dilated. Patient wholly unconscious.

I catheterized the bladder, and drew off eight ounces of smoky urine. Injected hypodermically $\frac{1}{25}$ grain of atropine sulphate, and immediately thereafter several hypodermic injections of aromatic spirits of ammonia with brandy. I also instituted artificial aid to respiration, and applied the battery over the solar plexus. Improvement became apparent at 5 A.M., and at 6 A.M. respiration had arisen to 11 per minute, and the radial pulse had returned. All methods were continued, and at 7.30 A.M. a second dose of atropine was administered,—$\frac{1}{25}$ grain.

At 8 A.M. patient swallowed medicine, and from this time on brandy, ammonia, and belladonna were given per os. At 10.30 A.M. patient moved without assistance, and roused up easily upon being shaken. A sharp cathartic and diuretic in combination were given at 9.30 A.M., and soap-and-water enema at 2 P.M.,

resulting in a pretty free action from both bladder and bowels. Recovery from this time on was uninterrupted. The points of special interest are:

The large dose and long time after ingestion.

The value of persistent effort even when death seems imminent.

The antidotal value of atropine.

The pills were fresh ones, and there is a strong probability that a large percentage of the amount of morphine taken was absorbed.

J. K. BEEBE, M.D.

Notes and Queries.

NERVES AND NARCOTICS.

In the May number of the *Breslau Deutsche Revue*, reproduced in the *Scientific American*, August 15, 1891, DR. ADOLPH SEELIGMULLER discusses the universal subject of nerve troubles as follows: "Excessive, exhausting, and too long-continued work, insufficient or irrational recreation, and deprivation of the right amount of sleep are some of the main causes for the increase of nerve troubles in our day. The competition in all the professions and callings is so great that for every person whose powers fail, ten are ready with fresh strength to perform the same or greater labor for the same or even a smaller remuneration. All exciting and weakening amusements should be done away with, and the quiet joys of family intercourse, the conversation of intimate friends, and sociable walks in the fields and woods should take the place of brilliant evening assemblies. Then every person should pursue some agreeable occupation besides his regular profession, and in the latter he ought to have frequent hours of relaxation to relieve the strain. Mental application, even for healthy adult persons, ought not to be continued for more than three or four hours at a time, and night-work it would be best to avoid altogether, as the excitement is apt to interfere with sleep.

"All who follow intellectual pursuits ought to have several weeks of complete rest at least once a year. Sleep is, however, the principal agent of recuperation. The amount of sleep needed is different for different persons. For the ordinary worker from six to eight hours is absolutely necessary; yet how often, in the battle for existence in our time, is the desire for sleep forcibly suppressed and the night's rest improperly shortened. Sooner or later insomnia wreaks its vengeance on the offender. Many a person who once robbed himself of the necessary amount of sleep would gladly sleep now, but cannot. I do not hesitate to say that nerve troubles first develop into disease when joined with sleeplessness. It appears as a later symptom of a long-standing nervous disturbance, but to the lay mind it appears as the first sign of disorder, and is frequently taken to be the cause. The worker of the nineteenth century works beyond his strength, and in order to keep it up he resorts to stimulants,—coffee, tea, spices, alcohol, tobacco. These produce a superexcitation of the nerves, which brings in its train insomnia; and to overcome this he resorts to narcotics. The life of many of our contemporaries consists in taking artificial stimulants to enable them to perform their work, and then resorting to powerful narcotics that can counteract the artificial stimulation and produce rest and sleep.

"Any one can see that this alternation of stimulation and depression at least once every twenty-four hours must weaken the nervous system. Coffee is a powerful stimulant for the heart, and therefore those who suffer from palpitation, from hysterical conditions, or from insomnia should avoid its use. Tea in daytime acts more mildly on most people; but taken evenings it drives away sleep. The spices are less active nerve-stimulants; yet pepper especially, and some of the others, affect the nerves of the digestive organs powerfully, and their liberal use in modern cookery has something to do with the epidemic insomnia. Of the injurious, the actually destructive, effects of alcohol taken in excess little need be said. We physicians are not a little to blame in that we insist on giving large quantities of alcohol in fevers and conditions of exhaustion, not to speak of the methods used to cure the morphine habit, until patients often acquire the drinking habit. The evil results of the abuse of alcohol are not often apparent. Long before *delirium tremens* or other serious brain-diseases appear, they are preceded by manifold nervous disturbances, the real cause of which is not often understood. I have frequently found that rheumatic pains that were ascribed to a cold were nothing but alcohol neuritis, a mild form of inflammation of the nerves resulting from the use of alcohol, which disappeared when the practice was given up, only to return with the slightest repetition of the indulgence. Most habitual drinkers, and some of them very early, are subject to changes in the vascular organs, such as fatty degeneration of the heart

and arterio-sclerosis, which lead to grave affections of the nervous system, like apoplexy and softening of the brain. Finally, it may be taken as proved that the children of drunkards, if they are not carried off prematurely by brain troubles, are frequently afflicted with serious nervous ailments, such as epilepsy, idiocy, and the like.

"Tobacco has come to be in our time a national poison in many countries, and most especially in Germany. As sequels of chronic nicotine intoxication may be noted without fear of contradiction: Palpitation and weakness of the heart; irregularity of the pulse, of which heart-pang or *angina pectoris* is an acute symptom; general nervous debility; tremulousness; disturbances of vision, even to the point of blindness; and hypochondriacal depression, even to the degree of melancholia. The fear-inspiring intermission of the pulse is a frequent cause of inveterate insomnia. That the children of heavy smokers suffer with uncommon frequency from nervous diseases is an established fact.

"And now for the narcotics, at the head of which stands morphine. The great danger of falling into the habitual use of this drug arises from the cowardice and degeneracy of our times. No one will suffer pain, no matter how slight or transitory. Not a tooth can be drawn, not a child born into the world without the use of an anodyne, and when death comes we must have euthanasia. It is said that many physicians lend their hands too willingly and are ready with the injecting-needle to check a pain that could easily be borne, not reflecting that it is immoral to encourage effeminacy and a dangerous thing to plant the germ of the morphine habit, a terrible passion, that leads inevitably to physical and spiritual debility and to death. The same is true of the constantly-increasing cocainism and hashish intoxication. Our generation demands above everything narcotics to produce the sleep that first we drive from us, and afterwards so fondly desire: opium, morphine, chloral, bromide of sodium, paraldehyde, hydrate of amyl, urethan, sulphonal, hypnone, somnal, and whatever are all their names,—one would think names would soon give out, so fast are these children born. But how can we sleep without resorting to soporifics? Just as the life of the soul during the day is reflected in dreams, so the conditions of sleep are determined by all that we do when awake. The chief rule is to so act waking that you can sleep. Begin by accustoming yourself to do without excitants. Many a case of sleeplessness will yield, when all other means fail, to restricting or totally abandoning for a time the use of spirituous drinks, coffee, tea, and tobacco."

POISONING WITH CHLORATE OF POTASSIUM.

DR. LAUDERER reports the case of a shoemaker, aged 18, who died from the toxic effects of this widely-used drug. Patient came to hospital complaining of tonsillitis, for which he got a gargle of 300 grammes (nearly ℥ss) dissolved in a glass of warm water. He swallowed the whole within half an hour in two drinks. The first symptoms of the drug were weariness, thirst, giddiness, followed rapidly by most alarming symptoms, arising presumably from the action of the salt on the blood: Acute anæmia, dyspnœa, cyanosis, persistent vomiting of a greenish fluid, pain in the hypochondria and around the umbilicus, with icterus. After this, liver, spleen, and renal symptoms set in. During seven days' illness the urine eliminated did not exceed 100 c.c. (= 1543.2 grains = 6.1 cubic inches, or 3½ ounces nearly). By means of the indo-sulphuric acid test not a trace of potass. chloratis could be found. The dark-brown sediment of the urine cleared up next day. Albumen was present from beginning to end. From third day epithelial cylinders were sparingly present, while the methæmoglobin cylinders were found in great numbers from the very first day, and disappeared gradually with the clearing of the urine. The spectroscope examination of the filtered urine gave the methæmoglobin spectrum. Lauderer considers—1. That the poison is simply the action of the drug, and produces changes in the physiological condition of the blood. 2. Acute nephritis is not necessarily present in all cases; but where the illness is protracted it is seldom absent, owing to the mechanical irritation of the renal epithelium. 3. The constant presence of icterus is partly due as a policholic origin and partly as hæmatogenous. 4. The vomiting, constipation, etc., are probably due to the fine peptic ulcers, produced by capillary emboli, formed by the methæmoglobin clots. 5. Cyanosis is due to the insufficient arterializing of the blood in the lung. 6. The waste material of the blood is found to be identical with that found in the renal canals from urine analysis probably having passed thither by diapedesis. 7. The best treatment in such cases within the first twenty-four hours after swallowing the salt

would be venesection, followed by infusions of sodium chloride, or, better still, transfusions of defibrinated blood. 8. Internally, potassium chlorate should not be used, more especially in children. The quantity of the drug should be carefully limited in gargles, so that small doses may be taken in cases of accident.

Wohlgemuth reported another case of intoxication from a two and a half per cent. lotion, of which the patient had used a tablespoonful every two hours for eight days for angina, a swelling on one side of the face. The appetite was lost; giddiness, thirst, etc., were present; urine dark with albumen, but no methæmoglobin. About the sixteenth day small punctiform hemorrhage spots, varying in size, were found over the legs, which soon extended over upper limbs and trunk. Wohlgemuth remarked that a four or five per cent. lotion is usually prescribed in adults without any untoward effects, but in this case he thinks the disturbed digestion and loss of appetite was the chief factor of the poisonous absorption. He advises this drug not to be administered on an empty stomach nor long continued without examining the urine for methæmoglobin, by which the dose should be guided.—*Medical Press and Circular*, July 8, 1891.

TASI—A SOUTH AMERICAN GALACTAGOGUE.

A South American asclepiadaceous plant, *Morrenia brachystephana* Grisebach (first described by this botanist in his "Plantæ Lorenzianæ," No. 575), has long been reputed among the natives of Argentina as an excellent galactagogue. Attention has recently been drawn to it in Europe by a paper submitted to the German Chemical Society (*Berichte*, 1891, p. 1849), by Dr. Pedro Arata and Carl Gelzer, on the chemistry of the plant. Dr. Arata, who is a member of the National Board of Health of the Argentine Republic, has made systematic experiments with the *sap* of the plant during the past eighteen months.

He reports the case of a woman whose milk gave out seventy days after the birth of a boy. An infusion of the milk sap of the plant was administered to her, when, after a very short time, an abundance of milk was secreted, so that the child could be fed without the aid of a nurse. The average daily dose administered was 30 grammes (about 1 ounce). The infusion prepared from the sap is yellowish and slimy and has a greenish taste with a bitterish after-taste. It is not disagreeable to take, but when first administered causes a slight nausea and a little headache, also an increased perspiration, but no other untoward symptoms.

The plant is known to the natives of Argentina under the name of *tásis*. [Hieronymus, in "Plantæ Diaphoricæ Floræ Argentinæ," 8vo, Buenos Ayres, 1882, p. 177, has *tasi*.—Ed. *American Druggist*.]

The plant grows all over Argentina, and is now chiefly cultivated on account of the fine silky hairs contained in the fruits, which heretofore were used as tinder by the Indians and gauchos, but are now turned into "vegetable silk." The rhizome and fruit of this plant contain an abundance of a milky juice, which is used by the natives as a domestic remedy in various diseases, but has an especial reputation as a milk-maker. The authors of the paper above quoted state that elaborate reports on this property of the plant are contained in the "Boletin Oficial de la Exposicion National de Cordoba en 1871," p. 63 *sqq*.

There is another species of tasi found in Argentina, which is *Morrenia odorata* Lindley. According to Hieronymus (*loc. cit.*), it is also called *doca*. The fruit capsules of this exude an aromatic resin, whence its name.—*American Druggist*, August 15, 1891.

NAPHTHOL-ANTIPYRIN.

Several combinations of antipyrin with compounds of the phenol class have been described recently, and M. Patein has reported the preparation of such combinations with α- or β-naphthol, the former of which is a liquid and the latter crystalline. M. Patein now states (*Journ. de Pharm. et de Chim.*, June 15, p. 585) that the β-naphthol compound can be made by dissolving one hundred and fifty grammes of naphthol in ninety per cent. alcohol, and adding to it gradually one hundred and ninety grammes of antipyrin dissolved in the smallest possible quantity of water, stirring constantly with a glass rod. After a few minutes a viscous mass is formed, and then upon stirring more vigorously, so as to effect a thorough division, at the end of five or ten minutes the liquid clears, and the β-naphthol-antipyrin is deposited in very small but pure crystals that can be collected on a filter. The yield is said to be theoretical, and the whole operation requires not more than a quarter of an hour. If the small crystals be dissolved in hot sixty-

cent. alcohol, and the solution be allowed to cool slowly in a flask, fine colorless crystals can be obtained that melt at 82° to 83° C., and are soluble in alcohol and in ether, but are decomposed by cold water into naphthol, which separates, and antipyrin, which remains dissolved. In order to prevent this decomposition, a mixture of 25 parts by weight of ninety per cent. alcohol with 40 parts of water should be used. A nitrogen determination was considered to show that the product is a combination of antipyrin and naphthol, molecule for molecule, without elimination of water.—*American Druggist*, August 15, 1891.

PYOKTANIN IS A FAILURE AS AN ANTISEPTIC.

Pyoktanin is a failure as an antiseptic, says Dr. Roswell Park (*Annals of Surgery*). It cannot be relied upon in surgery except in strength that is dangerous. As an injection in gonorrhœa, he adds: "I have had no experience with it, but find that most of those who have tried it have met with disappointment. Upon granulating surfaces it does appear to be stimulating and to exert a desirable effect, but no more so than other substances within easy or easier reach, and its stain is often undesirable. In ophthalmological practice it appears also to have scarcely come up to the requirements of the day. On the whole, then, it has but few qualities by which we are to commend it above numerous other drugs of its general class, while in all that may answer to the more scrupulous demands of aseptic surgery it has proved in my hands—as in those of others who have tested it from the purely clinical stand-point — disappointing."—*New York Medical Journal*, August 15, 1891.

DIURETIN.

The accounts of the action of diuretin (theobromine-sodio-salicylate) have varied so much that it is not by any means certain whether this drug can be admitted on our list of reliable diuretics. All we can at present do is to form our own conclusions from the published results. Dr. Heissler has tried its effect on one healthy subject, four patients with heart-disease, two with nephritis, and one with cirrhosis of the liver. His observations were made at three periods,—viz., before, during, and after the use of the drug. The conclusions drawn from his results are as follows: 1. The drug certainly produces a rise of blood-pressure. 2. It is not only a diuretic, but has an action on the heart. 3. It gives remarkable results, especially in cases of "asystoly" without valvular incompetence. 4. When the heart-muscle is diseased the diuretic effects are much less marked. 5. Diuresis is much more abundantly produced in acute than in chronic nephritis. Albumen is never increased as a consequence of the administration of diuretin. 6. No diuresis followed its use in the case of cirrhosis of the liver. 7. On the healthy man the drug has but little effect.—*Medical Record*, July 4, 1891.

A MEANS OF PRESERVING FEHLING'S SOLUTION.

As is well known by all who have even had little experience in the testing of urine by Fehling's solution, this reagent becomes unreliable after it has been kept but a few weeks. In the *Lyon Médicale* for July 12, 1891, Dr. L. Patel suggests as a simple means of avoiding this inconvenience that a solution of sulphate of copper and an alkaline solution should be prepared and kept separate, and only mixed at the amount of testing. As is well known, Fehling's solution is composed of sulphate of copper, 34 grammes; tartrate of potassium and sodium, 173 grammes; caustic soda, 300 c.c.; aq. distill., q.s. ad 1000 c.c. The tartrate of potassium and sodium are dissolved in 300 c.c. of distilled water, which, united with the 300 c.c. of caustic sodium, form 600 c.c. of an alkaline solution. 34 grammes of the sulphate of copper are then dissolved in the remaining 400 c.c. of distilled water, and it is only necessary that these two solutions be mixed to obtain a litre of Fehling's solution. In testing it is important that care be employed when the mixture is prepared that the proper proportions are observed; thus, at the moment of testing with a pipette 6 c.c. of the alkaline solution and 4 c.c. of the solution of copper should be mixed in a test-tube so as to obtain 10 c.c. of a perfectly fresh and absolutely reliable preparation of Fehling's solution.

THE ACTION OF THE LIVER ON COCAINE.

The symptoms of intoxication observed after an overdose of cocaine present several points of difference, according as the drug has been injected subcutaneously or swallowed, an observation which holds good with respect to other substances besides cocaine.

So far as this drug is concerned, it has now been determined experimentally that cocaine introduced directly into the general circulation is four or five times more toxic than when injected into the portal vein. This difference of toxicity is attributable to the action of the liver during the passage of the drug through that organ. Not only are the toxic properties lessened, but they are otherwise modified, for after injections of the drug into the portal vein the convulsions are less powerful and less frequent, and the rise of the temperature is not so much marked as when injected into a peripheral vessel. It is probable, therefore, as M. HEY points out, that the liver retains a large proportion of the poison, and modifies the constitution of the portion allowed to pass.—*Medical Press and Circular*, July 22, 1891.

MEDICINAL QUALITIES OF NUTMEGS.

The medicinal qualities of nutmegs are worthy of considerable attention on account of their value in the treatment of diarrhœa, many cases quickly yielding to the administration of half a drachm in milk. Insomnia may be effectually relieved by them when opium fails and chloral is not advisable. It is also a sedative in delirium tremens, and can be given with safety and marked benefit. An excellent ointment for itching and irritable hemorrhoids is composed of two drachms of powdered nutmegs, one drachm of tannic acid, and one ounce of lard (*Medical Bulletin*).—*Dietetic Gazette*, August, 1891.

TACHYCARDIA.

FRAENTZEL defines this disease as one without demonstrable organic heart lesion, in which repeated sudden attacks of rapid heart action occur and as suddenly disappear. The number of beats may reach 140 and over per minute. He considers most of the cases to be due to paralysis of the inhibitory fibres of the pneumogastrics, and others to irritation of the accelerator fibres of the sympathetic. The former may sometimes be controlled by digitalis, or by pressure over either or both pneumogastrics in the neck. The latter may frequently be controlled by a single dose of morphine. It is sometimes difficult, however, to determine to which of the two groups a case belongs. The author closes his article by quoting the following case: A man, aged 35, complained for three months of sudden severe palpitation of the heart. The heart's dulness was increased; there were no murmurs. While in the wards, the patient had two attacks which responded to digitalis. A third attack occurred, with rapid dilatation of the heart, in which the patient died. The post-mortem showed dilatation of left ventricle and hypertrophy of right, much increase of fibrous tissue in both ventricles and fatty degeneration of the left.—*Boston Medical and Surgical Journal*, July 9, 1891.

PERMANGANATE OF POTASSIUM FOR BURNS.

Compresses dipped in a solution of one to ten grammes of potassium permanganate to thirty grammes of water, and frequently renewed, are mentioned by DR. ZUBOFL (*Inter. Pharm. Gén. Arz.*) as a most excellent application for burns of the first and second degrees. Weaker solutions speedily allay the inflammation resulting from blisters, and relieve pain while preventing suppuration.—*Druggists' Circular*, August, 1891.

TREATMENT OF BLENNORRHŒA.

DR. J. W. WHITE, of the University of Pennsylvania, recommends the following for the internal treatment of urethritis, specific and non-specific:

Salol, 7 parts;
Oleo-resin of cubebs, 2 parts;
Balsam of copaiba, 20 parts;
Pepsin, 2 parts.

Mix, and put up in 20-grain capsules. The dose is 1 capsule thrice daily. The doctor uses as an injection from 2 to 10 grains of sulpho-carbolate of zinc dissolved in 1 ounce of a 10-volume solution of hydrogen peroxide.—*National Druggist*, August 15, 1891.

INFLUENCE OF AGE ON THE ABSORPTION OF DRUGS.

It has been positively shown, as a result of DR. YATSUBY'S experiments on healthy male subjects, between the ages of 8 and 80, that, as a general rule, the absorption of medicinal substances takes place more rapidly in the young. Thus iodine was detected in the urine of a boy 8 years old and weighing twenty-five kilogrammes, nineteen minutes after he had taken .15 gramme of potassic iodide, while in the case of a man aged 36, weight 66 kilogrammes, who took .4 gramme, thirty-one minutes were required to produce the same effect. Sodium salicylate was ab-

sorbed by boys and young men in about fifteen minutes, by middle-aged men in twenty minutes, and by old men in twenty-five minutes. An exception, however, occurred in one case, where iodine appeared in the urine of a septuagenarian three minutes sooner than in that of an 18-year old boy.—*Druggists' Circular*, August, 1891.

DERMATOL.

B. FISCHER publishes the following method of preparation, as it is stated that the process by which it is made by Meister, Lucius & Brüning is to be patented: 15 parts bismuth subnitrate are dissolved in 30 parts glacial acetic acid, 200 to 250 parts water added and filtered; to this solution is added, with constant stirring, a warm solution of 5 parts gallic acid in 200 to 250 parts water. The precipitate is first washed by decantation, then on a filter until the washings are free from nitric acid; lastly, it is dried at 100° C. The saffron-yellow powder should not yield anything to alcohol (absence of gallic acid), and should yield not less than fifty-five per cent. bismuth oxide (theory demands 56.66 per cent.).—*Druggists' Circular*, August, 1891.

ARSENIC IN THE TREATMENT OF WARTS.

DR. PAUL MÜLLER, of Hamburg, writing in the *Allgemeine Medicinische Central-Zeitung*, "cannot sufficiently recommend" the internal use of arsenic in the treatment of warts on the hands. He has employed it for more than two years, and always found the warts disappear within three weeks. Another practitioner, Dr. Pullin, who seems to have used arsenic for the same purpose somewhat longer, says that he has known it cure warts in eight days. The dose ordered by Dr. Müller is only at the beginning 2 drops of liquor arsenicalis three times a day for adults, and ¼ drop for children. These quantities are gradually increased.—*Lancet*, July 4, 1891.

TREATMENT OF STYE.

At the commencement, as soon as the irritation is felt, apply compresses dipped in a three or four per cent. aqueous solution of boracic acid. After several hours, carefully wash the borders of the affected lid with the same solution by means of a pledget of absorbent cotton dipped in the fluid. During the night apply compresses wet with boracic acid, or a cataplasm of potato starch made up with the acid solution. The next morning a white spot will show itself in the centre of the little tumor. This should be incised with a sharp, thin lancet, and the compresses again used. A solution of corrosive sublimate, 1 part in 5000 of water, may be used instead of the boracic solution.—*National Druggist*, August 1, 1891.

ANOTHER ANTIPYRETIC.

Another addition to the long list of antipyretics and antineuralgics is announced (*Pharm. Centralb.*, July 23, p. 433). It is described as an oxyquinoline derivative, or, more precisely, as ortho-oxethyl-ana-monoacetylamido-quinoline. The process of preparation is said to be by boiling ortho-oxyquinoline with halogenethyl and sodium hydroxide in alcoholic solution, and treating the ethyl ether so obtained with nitric or nitro-sulphuric acid. A mononitro compound so produced, in which the nitro group is in the "ana" position, is precipitated from an acid solution by ammonia, then reduced to an amido compound by means of tin and hydrochloric acid, and finally has the acetyl group introduced by boiling it with acetic anhydride. The new compound is described as melting at 155°; also as dissolving freely in hot water, alcohol, and dilute acids, and with difficulty in cold water.—*Pharmaceutical Journal and Transactions*, August 1, 1891.

THE IODIDE OF CARVACROL.

Carvacrol, an isomere of thymol, gives iodated derivatives possessed of properties analogous to those of the iodated derivatives of phenol and corresponding acids. The iodide of carvacrol occurs in the form of a yellowish-brown powder, insoluble in water, slightly soluble in alcohol, readily soluble in ether, chloroform, and olive oil. It does not decompose under the influence of light, and has been recommended as a substitute for aristol.—*Journal de Médecine de Paris*, August 2, 1891.

NO INJECTIONS FOR GONORRHŒA.

According to the New York correspondent of the *Southern Medical Record*, DR. JOHN A. WYETH deprecates the employment of injections of any kind in gonorrhœa, and says that they generally do more harm than good. He recommends the use of the oil of gaultheria,

in 6-drop doses, three times a day, as a more efficient and safer remedy for acute urethritis than any other preparation generally advised for that purpose. The common practice of placing a piece of lint or absorbent cotton over the meatus is wrong in practice, as it interferes with the free drainage, and brings the acrid discharges from the urethra in direct contact with the glands and prepuce. A bag of oiled silk or an ordinary cloth should be made large enough to fit loosely over the penis, and held in place by strings which pass up to a belt worn around the waist.—*Practice*, June, 1891.

CREOLIN AS A DEODORIZER OF IODOFORM.

DR. VARZI recommends the employment of creolin as entirely removing the offensive odor of iodoform, and as depriving the latter of all local irritating action. He employs an ointment composed of 2 parts of iodoform, 1 of creolin, and 25 parts of vaseline.—*Lyon Médicale*, June 21, 1891.

ANTIPYRIN IN CHOREA.

In the *Revue Mensuelle des Maladies de l'Enfance* for August, 1891, DR. CHARLES LAROUX concludes a long publication, embracing the record of sixty cases of chorea treated by antipyrin, with the following summary:

Of these sixty cases, in forty-one the result was satisfactory, in nineteen unfavorable. Of the forty-one cases, in nineteen the average duration of treatment was twenty-one days, of seven favorable cases the duration of treatment was forty-three days, and of seven fairly satisfactory cases the disease had lasted sixty-eight days and the treatment forty-nine days; nineteen cases were not amenable, either on account of the absence of any effect from antipyrin, from the intolerance to the treatment, in vomiting, diarrhœa, etc., or from the fact that eruptions were produced by the drug. Relapses were frequent, occurring thirty-six times out of sixty. Antipyrin was given in large doses,—45, 60, and 90 grains daily,—according to the age, the author finding that it was necessary to rapidly pass through very large doses; nevertheless, children from 6 to 15 years of age were able in the majority of cases to sustain for many weeks doses of 45 to 90 grains daily. Apart from the eruptions and transient digestive disorders, the author met with no case of severe poisoning, and even when it had to be suspended, from its producing an eruption or indigestion, after a short interval its use could be again proceeded with without unfavorable effect. In no case was albuminuria produced.

RULES FOR THE ADMINISTRATION OF COCAINE.

DR. MAGITOT, in the *Repertoire de Pharmacie* for August 10, 1891, formulates the following rules which should govern the employment of cocaine as an anæsthetic:

1. The dose of cocaine injected should be appropriate to the extent of the surface desired to render insensitive. It should not exceed in any case 1 to 1¾ grains. Each dose should be restricted in large surfaces.

2. Cocaine should never be employed in cases of heart-disease, in chronic affections of the respiratory apparatus, or in nervous subjects; and this exclusion applies also to the other anæsthetics.

3. Cocaine should be injected into the interior and not under the derm of the mucous membrane of the skin. This is the intradermic method of Reclus, which should be substituted for the hypodermic method. By this means the introduction of a substance into the vein is avoided and the risk of accidents therefore minimized.

4. The injections should always be practised upon the subject in a recumbent position, and he should only be raised when the operation is to be performed upon the head and mouth, and then only after anæsthesia is complete.

5. The cocaine should be absolutely pure, since, as pointed out by Laborde, its mixture with other alkalies forms highly poisonous compounds.

6. Cocaine should be injected in divided doses, with a few minutes' interval.

7. Suspension of administration, or, as the author terms the method, "fractional injection," renders it possible to guard against the production of sudden symptoms of poisoning.

EUROPHEN.

It is known that by the action of iodine upon bodies of the phenol series in the presence of alkalies, compounds are produced that are claimed to possess antiseptic properties. The best known of these is the "dithymoliodide," which has been introduced into medical practice under the name "aristol." It is now stated that similar properties are pos-

sessed under more advantageous conditions by certain compounds formed in a like manner from substitution derivatives of homologues of phenol, and one of these has just been described under the name "europhen." This substance is said to be produced by the action of iodine upon isobutylorthocresol, which is itself a product of the action at a high temperature of isobutyl alcohol on cresol in the presence of chloride of zinc. In composition europhen is said to contain 27.6 per cent. of iodine, corresponding consequently to one atom of iodine to two molecules of isobutylcresol. At first it was thought that this was a case of simple condensation of two benzole residues, with the substitution of an atom of hydrogen in one of the cresol hydroxyls by an atom of iodine. It is now, however, explained that the simultaneous presence of iodine, alkali, and water would be a condition favorable to the formation of hypoiodous acid, HIO, the oxygen of which, combining with the hydrogen from the hydroxyls of two molecules of cresol would give rise to the splitting off of water, the reaction being represented by the following somewhat doubtful equation:

$$\left.\begin{array}{l} HO-C_6H_3<\begin{matrix}C_4H_9\\CH_3\end{matrix} \\ HO-C_6H_3<\begin{matrix}C_4H_9\\CH_3\end{matrix}\end{array}\right\} + HIO =$$

Isobutylcresol.

$$HI\left\langle\begin{array}{l} O-C_6H_3<\begin{matrix}C_4H_9\\CH_3\end{matrix} \\ O-C_6H_3<\begin{matrix}C_4H_9\\CH_3\end{matrix}\end{array}\right.$$

Europhen.

Europhen is described as being an amorphous yellow powder, resinous to the touch, and adhering to the mucous membrane or intact cuticle much more readily than iodoform. It is stated to have a peculiar aromatic odor, recalling that of *o*-cresol and also of saffron. In water and glycerin it is insoluble, but it is freely soluble in alcohol, ether, chloroform, collodion, traumaticin, and fixed oils. A solution in oil is said to be useful for subcutaneous injection in various affections, but it should be filtered before use. The europhen action seems to be familiar to that of iodoform, by slow liberation of iodine in contact with pus, but it is claimed that the new compound presents the advantage of being comparatively free from odor, non-toxic, and so light that a given weight of europhen will cover five times as much wound surface as the same quantity of iodoform. The selection of a trivial name for this novelty can hardly be deemed a happy one, since "europhen" is sufficiently near to "euphorin," the designation recently applied to phenyl-urethan, to provide for a considerable amount of confusion should both compounds come into general use. —*Pharmaceutical Journal and Transactions*, August 1, 1891.

TO ABORT A FURUNCLE.

The early application of the ointment of the nitrate of mercury is recommended as an effective means of aborting a boil.—*American Druggist*, August 15, 1891.

AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

The American Electro-Therapeutic Association will hold its first annual meeting at the hall of the College of Physicians, corner of Locust and Thirteenth Streets, Philadelphia, Pa., Thursday, Friday, and Saturday, September 24, 25, and 26, 1891, under the presidency of Dr. G. Betton Massey.

Physicians interested in the discussion of electricity in medicine are invited to attend without further notice.

HORATIO R. BIGELOW, M.D.,
Chairman Executive Council.
WM. H. WALLING, M.D.,
Secretary,
2005 Arch Street, Philadelphia.

MEMBERSHIP IN THE AMERICAN MEDICAL ASSOCIATION.

This is obtainable at any time by a member of any State or local Medical Society which is entitled to send delegates to the Association. All that is necessary is for the applicant to write to the Treasurer of the Association, DR. RICHARD J. DUNGLISON, Lock Box 1274, Philadelphia, Pa., sending him a certificate or statement that he is in good standing in his own Society, signed by the President and Secretary of said Society, with five dollars for annual dues. Attendance as a delegate at an annual meeting of the Association is not necessary in order to obtain membership. On receipt of the above amount the weekly journal of the Association will be forwarded regularly.

DR. J. P. CROZER GRIFFITH, Professor of Clinical Medicine in the Philadelphia Polyclinic, has also been elected Clinical Professor of the Diseases of Children in the University of Pennsylvania.

—THE—

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Original Communications.

*CLINICAL THERAPEUTICS—LECTURES ON THE TREATMENT OF HEPATIC AFFECTIONS.**

By Professor Dujardin-Beaumetz,† Paris, France.

LECTURE II.—THE LIVER AS AN ORGAN OF ANTISEPSIS (CLINICAL AND THERAPEUTIC CONSIDERATIONS).

GENTLEMEN:—In my last lecture I showed you on what experimental proofs we may base our belief in the antiseptic functions of the liver, and the really important *rôle* which this organ plays as a destroyer of poisons. I intend to-day, in accordance with the order which I have marked out for myself, to study the clinical and therapeutic consequences which flow from these physiological properties; and, first of all, a question comes up for consideration whether we have any reliable clinical sign which may enable us to determine whether these antiseptic functions of the liver are disturbed?

When jaundice appears, we know well that the biliary functions of the liver are modified; the presence of sugar in the urine indicates perturbations in the glycosuric function. There are, moreover, general and local physical signs, which make known modifications in the hepatic circulation. We have not, however, any precise signs by which we may be able to affirm a normal or abnormal

* From advance sheets, revised by the author (translated by E. P. Hurd, M.D.). Lectures delivered in Cochin Hospital, Paris, France.

† Member of the Academy of Medicine, Physician to the Cochin Hospital, Paris, France.

state of the antiseptic functions of the liver.

Some have attacked the problem directly, and have thought themselves able to test the integrity of function of the hepatic cell by the presence of urobilin in the urine. Others have gone about it indirectly, and, relying on the fact that there is a correlation between the functions of the hepatic cell and the glycogenic function, they have sought a means of diagnosis in the production of experimental glycosuria. Still others have approached this problem of antisepsis of the liver by the new ways traced by Bouchard and his school, and have said that, in order to judge of the activity of the antiseptic functions, it suffices to examine the toxicity of the urine. We shall successively pass in review each of these methods.

The urobilin method originated in the researches of Hayem and his pupil Paul Tissier.* These writers have maintained that urobilin when appearing in the urine has always an hepatic origin, and that this substance results from a morbid functionating of the hepatic cells.

The testing of urobilin in the urine is extremely easy, and is very rapidly attained by the spectroscopic examination of the urine. The spectroscope employed, and which I here show you (Fig. 1), is for direct vision, and of moderate cost (the cost is but twenty-five francs), and it suffices to examine the urine with this spectroscope to see appear in the spectrum the characteristic band of urobilin; it is a band which appears between the rays *b* and *f* of Frauenhofer. In order well to observe this band, the urine should fulfil the following conditions: It should be freshly voided, as the urobilin undergoes modifications under the influence of oxygen; it should be limpid, and this is attained by filtration; lastly, it should be acid, and to obtain this acidity it suffices to add a few drops of acetic acid to the urine to be examined. You will simply apply the spectroscope to the test-tube containing the urine, and you will direct the apparatus to the side of the solar light, taking care to have the help of the bright clouds.

If you desire to measure the quantity of urobilin by the extent of the absorption-band, you must provide yourselves with tubes, all of which have the same dimensions. As for myself, I make use of the little glass-stoppered vial which I here show you (Fig. 2), and which always gives the same thickness to the stratum of liquid under examination.

FIG. 1.

Spectroscope for direct view.

When biliverdin exists at the same time as urobilin in the urine, the absorption-band

FIG. 2.

Vial for spectroscopic examination.

is much larger, and we see neither the violet nor the blue of the spectrum.

All the reactions, as you see, are very simple, and it suffices to have once seen the absorption-band of urobilin to recognize hence

* Tissier, *Thèse de Paris*, 1889.

forth its presence in the urine. The only difficulty results from the simultaneous presence of urobilin and bilirubin. You can, however, by a very simple process, based on the very great diffusibility of urobilin, separate urobilin from bilirubin. For this it will be sufficient to let fall, drop by drop, and with precaution, some distilled water in the urine to be examined (the two liquids should not be commingled); the urobilin will pass into the water, while the bilirubin will remain with the urine, and on examining with the spectroscope both of these liquids, you will be able to detect in the water the presence of the urobilin.

These preliminaries being settled, we have now to ask if the presence of urobilin is indeed characteristic of deranged function of the hepatic cell. It is worthy of note in this connection that even Professor Hayem, who defends the hepatic origin of urobilin, admits the presence of this latter in patients affected with certain hemorrhages, and in particular cerebral hemorrhages. On the other hand, in a series of researches which I have undertaken in this hospital, but have not yet finished, I have failed to find urobilin in certain well-marked cases of hepatic affections; but I am disposed to believe it to be true that, with the exception of cases of cerebral hemorrhage, when urobilin appears in the urine, there is bad functionating of the hepatic cells; while the converse is not quite exact, for there may be affections of the liver without urobilin. At any rate, it is a very simple process to which you can always have recourse when you suspect any hepatic affection.

I come now to the second test process,—that of the induction of experimental glycosuria. I have, in fact, told you that, according to Roger, there is always a correlation between the glycogenic activity of the liver and its antiseptic functions. Therefore it suffices to know whether the liver accomplishes well its glycogenic functions in order to know if it is in condition to destroy actively the poisons of the organism. Unhappily this second clinical problem is very difficult to solve.

We know by experiments of Colrat, of Couturier, of Lépine, and of Robineaud that when the liver is cirrhotic, and glucose is introduced into the economy, that substance appears in the urine. Unfortunately, this experiment, which I have often reproduced, is far from giving results as positive as might be desired, and in many cirrhotic patients I have not obtained glycosuria. My results are absolutely confirmatory of those of Roger, who in fourteen trials of administering glucose to patients suffering various hepatic affections has eight times obtained positive and six times negative results.

I will even endeavor, when I come to speak of the glycogenic liver, to show you that one of the conditions of diabetes is integrity of the liver. We cannot, then, count on this procedure to help us to decide as to the good functionating of the hepatic gland as a destroyer of poisons.

Moreover, this question of alimentary glycosuria is very complex. Do not forget that, according to Bouchard, the liver pours into the blood every day eighteen hundred and fifty grammes of sugar, which are burned by the economy, and that this combustion results from multiple circumstances which, according to the season, and also to the periods of working or repose, cause the quantity of sugar burned in the organism to vary considerably. Moreover, I shall come back to all these points when I speak of the glycogenic liver.

The third test-process, as I have said, is based on the determination of the toxic coefficient of the urine. You all know the important contributions of Bouchard and his pupils to the study of the toxicity of the urine, and the consequences which he has derived therefrom from a clinical and therapeutic point of view. I will, nevertheless, briefly sum them up for you, for there are points important to be remembered if one would appreciate at its just value this new experimental method.

It consists in injecting by the vein of the lobule of the ear of a hare a given quantity of urine, so as to cause the death of the animal. This is what Bouchard has described under the name of *urotoxy*, when he would refer this quantity of urine necessary to kill the animal to one kilogramme of the living being. Bouchard, moreover, calls *urotoxic coefficient* the quantity of urotoxy which one kilogramme of man can fabricate in twenty-four hours; and in order well to impress this subject on your minds, I will proceed in your presence to practise one of these injections.

Here is the urine of a man weighing sixty kilogrammes; this is the urine of twenty-four hours, and measures twelve hundred cubic centimetres. On injecting fifty cubic centimetres of this urine per kilogramme of the weight of the body in the vein of the lobule of the hare's ear, the animal succumbs. Hence,

twelve hundred cubic centimetres will kill twenty-four kilogrammes of hare. Our man weighs sixty kilogrammes, and secretes urine enough to kill in twenty-four hours twenty-four kilogrammes of hare. We have only then to determine by a simple rule of three how much one kilogramme of man fabricates in twenty-four hours available for killing one kilogramme of hare. You will obtain as an answer, four hundred grammes.

Hence the quantity of urinary poison which one kilogramme of man can furnish in twenty-four hours to kill one kilogramme of living animal is forty cubic centimetres. This is almost the normal figure, which is about forty-six cubic centimetres. But in the pathological state it oscillates between two and ten cubic centimetres. As you see, we may define thus the coefficient of toxicity; it is the quantity of toxic matter which the unit of weight produces in a unit of time.

In the physiological state this urotoxic coefficient presents certain variations. It is not the same during the waking hours and during sleep. During sleep, man eliminates from two to four times less poison than during the period of cerebral activity. The urine of the day and of the night has not the same toxic effects. Thus, while the urine secreted during sleep is convulsivant, that secreted during the waking hours has no such property, but produces narcosis. From this fact a new theory of sleep has been broached,—namely, that this physiological act is determined by the accumulation of toxines producing narcosis.

But let us return to our subject, and apply these data to the study of the *rôle* of the liver as a destroyer of poisons. In a large number of observations, which you will find reported in their entirety in the thesis of Roger,* in which he has studied the toxicity of the urine in patients suffering from hepatic affections, this experimenter has in the immense majority of cases found a notable augmentation of the urotoxic coefficient; this might have been expected, since the suppression of the physiological functions of the liver entails the disappearance of its destructive action on the animal toxines.

But now that this first fact has been determined, we must admit that, from a clinical point of view, it can furnish us but uncertain data, and this is true for numerous reasons: first, because such researches belong much more to the domain of the laboratory than to that of clinical medicine; and if at a recent competitive examination for the election of graduates to fellowship there were placed at the disposal of the competitors a patient, a laboratory, and a hare, it must be conceded that many physicians would be embarrassed if they were obliged in their daily practice to resort to experiments on the hare as a means of diagnosis.

But in admitting even that this fact remains simply an experimental curiosity, it only furnishes information respecting the antiseptic functions of the liver which is absolutely uncertain, because in most diseases of the liver there is icterus and derangement of the biliary secretion. As I shall tell you when I come to speak of the liver as a biliary organ, the bile is much more toxic than the urine, and while it takes forty-five cubic centimetres of urine to kill one kilogramme of living matter, it only takes five cubic centimetres of bile to obtain the same result; the bile is, then, nine times more toxic than the urine. Hence it is that if all the bile were to pass directly into the blood, a man would be poisoned in eight hours and fifty-five minutes; while if the urine of one day were to be reabsorbed, death would not take place in less than two days six hours and thirty-two minutes. Hence, then, according as the bile is secreted or not, the urotoxic coefficient will considerably vary, and for this reason this means of research loses its value if we wish to apply it to the test of the integrity of the antiseptic functions of the liver. Therefore, as you see, we can obtain by the methods which I have just enumerated only hints as to the state of the hepatic cell from the point of view of its destructive action on poisons, and if these hints lack precision, they enable us, nevertheless, to a certain extent, to affirm whether the liver is performing its functions well or badly.

I recommend to you especially the spectroscopic examination of the urine, which enables you to detect the presence of urobilin. And if the result proves negative, you can employ the method of experimental glycosuria, or the test for the toxicity of the urine.

I pass now to the therapeutic conclusions which are derived from the facts which I have just presented.

In diseases of the liver and in infectious diseases, whatever may be their origin, the therapeutist has the greatest interest in maintaining in its integrity the destructive power of the liver on toxines, and he should even

* "On Alimentary Glycosuria" (*Revue de Médecine*, October, 1886).

endeavor to augment it. To attain this there are two orders of means: 1. To augment the glycogenic functions of the liver, since, according to physiological experiments, there is an intimate correlation between the glycogenic functions and the antiseptic functions. 2. To restrain, as far as possible, the sources of poisoning of the organism, so as to reduce to its minimum the quantity of toxines which the liver must destroy.

Let us examine each of these points; and, first of all, the means for augmenting the glycogenic function of the liver.

We know, and I shall insist on this point in another lecture, that the glycogenic functions of the liver are depressed by abstinence and by hyperthermia.

If abstinence, or the withholding of food, be sufficient to diminish glycogenesis, we see the necessity of sustaining fever patients and those that have hepatic diseases by a diet as restorative as possible. It is well understood that this alimentation should fulfil certain conditions, to which I shall return in a moment when I come to the second point of the question which I have to treat,—*i.e.*, the suppression of the causes of the poisoning of the organism; we shall see, in fact, in this connection, that food is one of the most active sources of this poisoning.

To the necessity of feeding the fever patient is joined another necessity,—that of bringing down the temperature. Hence, then, from the exclusive point of view of the antiseptic functions of the liver, we must combat the hyperthermia. You know that we can attain this end by cold baths or tepid baths, or by the employment of that group of medicaments which are derived from the aromatic series. But these medicines have the great disadvantage of diminishing the secretion of urine, and thereby the excretion of toxines.

In his experiments, Roger seems to have demonstrated that glucose by itself modifies the toxicity of the vegetal or organic alkaloids. We may even draw this other conclusion,—that sugar, and glucose in particular, may be utilized advantageously in the infectious diseases, and that it is a good thing to sweeten the drinks of patients that have these affections. But this is a point that needs further study.

But of more practical importance is the great question which I am now to take up,—viz., how to restrain within the narrowest limits the sources of infection of the economy. Whenever we have to deal with an affection of the liver, of whatever nature, this indication forces itself upon us.

In the previous lecture I showed you that the animal toxines have four sources. They come from foods introduced into the digestive tube; they result from fermentations, which there take place at different stages of the digestive process; they are secreted by the microbes, which abound in the intestinal canal; lastly, they result from the activity of the cell-life.

To these four origins it is necessary to add a fifth, which is of pathological or, it may be, of therapeutic origin. Those of pathological origin are the toxines fabricated by the microbe that causes the infection, and constitute that class of diseases to which I have given the name of toxi-infections. Those of therapeutic origin are the alkaloids which we administer with curative intent.

From this particular point of view, in all patients suffering from affections of the liver, it is necessary to be very chary in the use of alkaloids introduced by the digestive tube, and, in particular, of certain of them such as morphine, atropine, and quinine, and to employ in preference the hypodermic method, because, in accordance with what I have said in a previous lecture, it remains demonstrated that the liver, having a special destructive action on these vegetable alkaloids, when this organ is diseased this destructive action no longer exists; and one is then quite likely to see supervene toxic accidents with therapeutic doses of these alkaloids introduced by the mouth.

As for the other causes of infection which I have above enumerated, we can combat or attenuate them by three orders of means:

1. By the practice of intestinal antisepsis.

2. By favoring the channels for elimination of the toxines.

3. By diminishing cellular activity.

Let us study each of these means.

Intestinal antisepsis, which constitutes the basis of this special medication, includes,—1, antiseptic medicaments; 2, purgatives; 3, a special dietetic regimen. At the head of antiseptic medicaments, we must place salol and salicylate of bismuth. Already, in a former number of the THERAPEUTIC GAZETTE, I have mentioned the reasons which have led me to consider salol as the best intestinal antiseptic. For instance, salol is but little irritating, being always well tolerated by the di-

not decomposed into phenic and salicylic acids till it reaches an alkaline medium,—*i.e.*, the intestines. If I add that this salicylate of phenol is relatively but little toxic, I shall have shown the superiority of salol over iodoform and naphthol, hitherto employed, and which are always toxic and irritant.

Almost on the same level I place salicylate of bismuth, which is applicable to the stomach as well as to the intestines, and I prescribe these two medicines under the form of wafers (*cachets médicamenteux*). This is my formula:

℞ Salol,
Salicylate of bismuth,
Bicarbonate of sodium, āā 10 grammes (150 grains). M.
Sig.—Make into thirty medicinal wafers.

As for the naphthols, I have not abandoned their use, but I employ them in lavements, and practise thorough washings of the intestines with a quart of the following solution:

℞ *Alpha*-naphthol, gr. v;
Boiled water, Oii.

I prefer the *alpha*- to the *beta*-naphthol because it is more soluble and more active, while being less toxic. I recognize at the same time that the *alpha*-naphthol is more irritant than the *beta*, but, diluted in the proportion of three to five grains to a quart of water, these irritant qualities are extremely feeble, and in the majority of cases this solution is tolerated.

In order to introduce this quantity of liquid, I would advise an apparatus similar to the fountain-syringe, and which I call an *entero-clyseur*, and which is made, according to my directions, by Galante (see Fig. 3). The canula, well oiled, is carried up into the rectum as far as possible, then the liquid is allowed to penetrate slowly and distend the large intestine; the patient, of course, is in a recumbent posture. The liquid which has thus been injected is not to be retained, but should be voided almost immediately.

2. Purgatives are only or principally useful when there exists constipation, and especially when this constipation resists the enemata of naphthol, of which I have just spoken. In such cases, the simple laxatives should be preferred. You can make use of my laxative powder, the formula of which I have many times given, and which I will once more repeat:

℞ Senna-pods,* washed with alcohol, in powder,
Sublimed sulphur, āā 6 grammes;
Pulv. fennel,
Pulv. star-anise, āā 3 grammes;
Pulv. pot. bitart., 2 grammes;
Pulv. licorice, 8 grammes;
Sacch. alb., 25 grammes. M.
Sig.—A heaping teaspoonful, in water.

You can also employ cascara sagrada and its extract cascarine, or the various purgative mineral-waters, and in particular such as come from Spain, which, by reason of the high percentage of saline ingredients which they contain, may be administered in doses of a wineglassful or more in the morning fasting. I might particularize the waters of Rubinat, Carabana, and of Villacabras.

FIG. 3.

Enteroclyser.

Diet plays a preponderant *rôle* in the congeries of therapeutic means designed to effect intestinal antisepsis. Here we witness the triumph of vegetarianism.

Regimen.—The dietetic regimen which I advocate, and which you will find set forth in

* *Vide* THERAPEUTIC GAZETTE, 1889, p. 624.-

its entirety in the recent work of Bonnejoy,* "On Vegetarianism," is composed, as you know, of eggs, milk, cereals, green vegetables, and fruits, and in order that you may always keep in mind the essentials of this regimen, I will here reproduce the directions which I am in the habit of giving:

The patient should live exclusively on milk, eggs, cereals, green vegetables, and fruits.

a. He should drink at least a quart of milk a day.

b. The eggs should be taken in any and every form that pleases the patient.

c. The starchy foods should be in mash or stew (stewed potatoes, beans, lentils, *revalescière racahout*, lactated farina; gruels and puddings of wheat, rice, Indian corn, barley, oatmeal, macaroni, strained panada).

d. The vegetables should be thoroughly cooked,—stewed carrots, turnips, Julienne; cooked salads, stringed beans, green peas, spinach, etc.

e. The fruits should be stewed, with the exception of grapes and strawberries.

If the patient is determined to eat meat, you will allow him only such meats as are well cooked and such as contain principally gelatin, such as lambs' or calves' feet stewed, calves' head, Scotch scollop, the sweet-breads of young calves (*ris de veau*), beef *à la mode*, calves' jelly, etc.

You will forbid fish, game, mollusks, crustaceans, old cheese, by reason of the toxines which putrefaction often develops in these articles of food.

You will also prohibit fat broths, while permitting such soups as are made of lean meats; *bouillon* is forbidden, as the potassa which it contains is prejudicial to the glycogenic functions of the liver, and thereby to its antiseptic functions.

You will permit sweetmeats and preserves, we have, in fact, seen in the previous lecture that sugar aids hepatic antisepsis.

So much for intestinal antisepsis. The second indication to fulfil is to favor elimination of the toxines formed in the organism, and you will attain this end by promoting diuresis by abundant beverages and such as are slightly alkaline, employing in preference white wine or restricting the patient to milk. You will take care, moreover, to promote the functions of the skin by tepid-water lotions, to which you may add Cologne-water or soap for those with greasy skins; these lotions are to be followed by energetic frictions with a hair glove.

Lastly, to diminish the leucomaïnes, the result of the organic operations of the cells, you will remember that excessive labor augments in very marked proportions the productions of these toxines. By the words *excessive labor* I mean mental as well as muscular toil. Hence overwork, which is one cause of the accumulation of these toxines, should be absolutely interdicted.

Such is the sum of therapeutic and hygienic means which you can put in operation; it remains for me, in finishing this lecture, to indicate in what cases we can apply this congeries of curative measures.

We have seen that there is a correlation between the glycogenic functions of the liver and its antiseptic functions. When I come to speak of the glycogenic liver, I will endeavor to show you that the integrity of the glycogenic functions is itself the measure of the integrity of the physiological functions. Hence, then, the action of the liver on poisons can only be properly realized when this organ is in a healthy state.

This first conclusion being admitted, there immediately flows therefrom a second,—namely, that all the affections of the liver modify to a greater or less extent its antiseptic action, and when these affections are accompanied by lesions sufficiently profound to destroy the hepatic cell, this antiseptic function will completely disappear. Hence, then, in all affections of the liver, we should employ the means which I have indicated, since this protective barrier established between the intestine and the rest of the economy will be more or less destroyed.

But just as diseases of the liver demand from the physician an antiseptic medication, so also and with more reason, the intestinal affections, and in particular those that are accompanied with putrid fermentations, demand the same therapeutic measures to oppose the affections of the liver consecutive to intestinal putridity. Bouchard, in fact, has shown us that in all patients affected with dilatation of the stomach,—and to these we must add those suffering from dilatation of the large intestine, as Trastour and Malibran have pointed out,—there are intermittent hepatic congestions. These congestions result from exaggeration of this antiseptic activity of the liver, whose functional resources are overtaxed by reason of the excessive production of intestinal toxines.

When you watch day by day these patients

* Docteur Bonnejoy, "Du Végétarisme", avec introduction par Dujardin-Beaumetz. Paris, 1897.

with dilatation of the stomach or intestine, you observe these hepatic congestions as a result either of errors in diet or neglect of the antiseptic medication.

When formerly lecturing on "Dilatation of the Stomach and Gastric Neurasthenia,"* I showed you that this congestion of the liver furnishes an explanation of the renal ectopia so often seen in such patients. Lastly, in infectious diseases with putridity, in order to avoid hepatic complications, it is incumbent on us to resort to the same medication.

Finally, do not forget that if the liver is a destroyer of poisons, it is also a producer of a very active toxine, especially in certain animal species. You are all familiar with poisoning by mollusks; this is produced by a toxalbumen secreted by the liver,—mitylotoxine. When I come to speak of the biliary liver, I shall have something to say about urticaria of hepatic origin, and I hope to show you that the human subject also produces, when the liver has been infected, a toxine similar to mitylotoxine, and which engenders, when the bile which contains it is absorbed by the intestinal mucosa, forms of urticaria of variable intensity. Here also you must trust to intestinal antisepsis such as I have just described for the successful treatment of these urticarias of toxic origin.

The brief considerations which I have just set forth show you the importance of the liver as a destroyer of poisons, and I hope that you have derived hints therefrom which will be of profit to you. In the next lecture I shall speak of *the biliary liver.*

THE SURGERY OF THE SPINE.†

By J. William White, M.D.‡

In endeavoring to systematize the study of the surgery of the spine it has seemed to me well to limit myself to the conditions requiring operative interference, or to those in which operation may reasonably be considered, and to exclude such as lateral curvature, the so-called "railway spine," etc., some of which belong to the province of the orthopædist, others to that of the neurologist.

I may classify those remaining as follows:

A. Congenital deformities;
B. Tuberculosis of the spine;
C. Neoplasms;
D. Traumatisms.

A. Under the first heading, spina bifida is the only condition which is at once of sufficient frequency and sufficient importance to demand special consideration. I have carefully reviewed the entire subject, and see no reason at present to dissent from the conclusion arrived at by the committee of the Clinical Society of London, and held, I believe, by the majority of surgeons at the present day. This is, that while various successes have been reported by other methods, such as simple tapping and drainage, and more recently in a limited number of cases by excision of the sac, yet on the whole the method of injection of the sac offers the best prospect of ultimate recovery with the least immediate danger. The method is described as follows:

> The sac being cleaned, a syringe which will hold about two drachms of an iodo-glycerin solution is chosen, and a fine trocar. The calibre of this must not be too fine for the thick fluid (iodine, 10 grains; iodide of potassium, 1 drachm; glycerin, 1 ounce) which has to pass through it. The puncture in the swelling should be made well at one side, obliquely through healthy skin, and not through the membranous sac-wall, the objects being to avoid wounding the cord or nerves, and also to diminish the risk of leakage of the cerebro-spinal fluid. Unless the sac is very large, it is probably better not to draw off much, if any, of the fluid from the sac on the first occasion. The position of the child during the injection has been a good deal dwelt upon, most authorities recommending that it should be upon its back. The Clinical Society's committee advises that the child should be laid upon its side. About a drachm is the quantity which they recommend. Every care must be taken to prevent any escape of the cerebro-spinal fluid now and later, it being clearly understood that any leakage, which is most difficult to prevent, may lead to septic meningitis and death. When the needle is withdrawn the puncture should be pressed around it, and immediately painted with collodion and iodoform, a dressing of dry gauze being also secured with collodion. A little chloroform may be given, to prevent any crying and straining at the time. The child should be kept as quiet as possible afterwards, on its side, and an assistant should make sure, for the first hour at least, that no leakage is going on. Shrinking of the cyst, setting in rapidly and continuing steadily, shows that all is well. If the injection fail altogether, or only cause partial obliteration of the sac, it should be repeated at intervals of a week or ten days.§

Sinclair, Robson, Evans (*N. Y. Med. Journ.*, 1888, p. 205), Hurd (THERAPEUTIC GAZETTE, October 1, 1889), and others have reported

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* THERAPEUTIC GAZETTE, January, 1890, p. 1.

† Read before the American Surgical Association at the Congress of American Physicians and Surgeons, Washington, D. C., September 23, 1891.

‡ Professor of Clinical Surgery in the University of Pennsylvania.

§ W. H. A. Jacobson, "Surgical Operations," Philadelphia, 1889, p. 986.

successful cases of excision, and more recently Bayer (*Prager Med. Woch.*, No. 20, p. 227) has reviewed the whole subject, and rejects the use of the seton, the injection of iodine, and the excision of a part of the sac, as being at the same time unsatisfactory and dangerous. He urges that the condition is one analogous to hernia, and should be treated in a somewhat similar manner; that the danger of meningitis in the one case is no greater than the danger of peritonitis in the other, and that, as compared with the operation above mentioned, it is both safer and more radical. In a child, 10 days old, in whom there was a large meningocele of the size of an apple, and who had already developed bed-sores, he performed the following operation:

The child was chloroformed, and the region of the bed-sores cleaned and rendered aseptic. Two lateral flaps were made from the skin covering the tumor, and were dissected down to its pedicle. The child was turned on its belly in order to avoid excessive loss of cerebro-spinal fluid, and the sac of the meningocele was opened. The cauda equina was seen flattened out on the posterior wall of the sac. It was loosened after dilatation of the incision, and was replaced in the spinal canal. The sac of the meningocele was then removed, leaving only two lateral flaps of the dura, which were sewed together after thorough antiseptic cleansing of the wound. The muscles and skin were afterwards brought together separately. The child recovered completely. Bayer suggests that possibly in the future, through a greater development of the technique of the operation, a bony roof over the sewed sac may be produced by forming two lateral periosteal flaps from the canal of the sacrum.

As I have had no personal experience with this procedure, and am not aware that it has been repeated by other surgeons, I have no opinion to express as to its merits, except to say that if we are to improve upon our present methods, it will be through the establishment on a sound basis of some such ideal operation.

B. In the second group of cases, which includes the various forms of tuberculosis of the spine,* our indications for operative interference may be,—1, the evacuation of pus; 2, the removal of a sequestrum or of the focus of carious bone; 3, the relief of the cord from pressure by pus, bone, or, most commonly, by the products of a simple or tuberculous external pachymeningitis.

These indications may coexist or may be quite distinct.

In considering the removal of the diseased bone, we may speak first of what Lannelongue has called "posterior vertebral disease,"—that is, cases in which the osseous lesions are localized in the transverse processes or in the laminæ. Chipault quotes cases of his own and of others,† including one by Demoulin (*Bull. Soc. Anat.*, 1887, p. 91), in which the removal of fragments of the arches of the twelfth dorsal and first lumbar vertebræ was followed after a brief period by a marked angularity of the spine just at the point of operation, and by complete paraplegia.‡

In all the other cases, seven in number, the result was perfectly satisfactory. Unfortunately, posterior vertebral disease is extremely rare. As regards disease of the bodies of the vertebræ, the most accessible region is without doubt the lumbar, and the now well-known operative procedure of Treves may be adopted as the best, with perhaps the slight modification suggested by Delorme, which consists in cutting the fibres of the quadratus lumborum on the level of each process and then abandoning the further use of cutting instruments.

The height to which we may safely ascend in attacking the laminæ of the vertebræ is a matter of much practical importance. According to Treves, the body of the twelfth dorsal vertebra is accessible, and Chipault admits that this is true provided that the finger is kept close to the spine and carried through the fibres of the psoas. If it is carried laterally he thinks that there is great danger of opening the pleura, which descends on each side below the twelfth rib, often even to the level of the transverse process of the first lumbar. As to the indications for interference, the existence of a psoas abscess, whether its vertebral origin is proved or not, is sufficient warrant for the lumbar operation, as affording the best drainage and at the same time permitting the removal of a sequestrum or the curetting of a patch of superficial caries, if they should be discovered by the finger or the probe.

Boeckel was the first to make a posterior

* In relation to this, as to the surgery of the spine in general, I desire to acknowledge my indebtedness to the recent and valuable additions to the literature of this subject made by Chipault, whose careful and exhaustive review of its history (*Archives Générales de Médecine*, October, November, and December, 1890) leaves little to be done in this direction.

† Lannelongue (*Bull. Soc. Chir.*, 1878, p. 162), Boeckel ("Fragments de Chirurgie Antiseptique," Paris, 1882, ch. v.), Polaillon (*Union Médicale*, 1883, t. i. p. 1073), Reclus (*Critique et Clinique Chirurgicales*, 1884, p. 114), Delorme (*Bull. et Mém. Soc. Chir*, November, 1886, and *Archiv. de Méd. et de Pharmacie Militaires*, 1887, t. i. p. 51).

‡ Chipault does not believe, however, that the surgical intervention should be regarded as the cause of this accident.

opening for an inguinal abscess of vertebral origin, Treves has operated twice, Fraenkel once, all of them successfully. If there should be any doubt as to this form of interference in cases where the abscess points in the inguinal region, there certainly can be none when it shows itself in the loin. Cases in which, after evacuation of such an abscess, diseased bone from the vertebra has been successfully removed have been quite frequent. Delorme, Buffet, Reclus, Abbé, Saint-Germain, Tuffier, and others have done this with good results. Sometimes the artificial cavity formed in the psoas renders accessible portions of the spinal canal which could not otherwise be safely approached. Delorme has in this way been able, guided by a lumbar abscess and after removing a portion of the twelfth rib, to curette the body of the eleventh dorsal vertebra. In these cases the pleura is protected by the wall of the abscess, and is probably itself thickened by a pleuritis in the vicinity.

The success obtained in the lumbar region has led several surgeons to attempt to operate upon the bodies of dorsal vertebræ.

Boeckel, having failed to cure an abscess situated at the inferior angle of the scapula by incision, curetting, and disinfection, enlarged his incision, removed a portion of carious third rib, and curetted the lateral aspect of the bodies of the second and third dorsal vertebræ. The patient recovered. Grünbaum did the same operation on the tenth dorsal.

Chipault believes, and, I think, correctly, that while the dorsal vertebræ are not absolutely inaccessible, and while in some cases they *may* be reached and curetted, such cases must be very exceptional, and it must be added that we have no satisfactory evidence that the vertebral bodies themselves have been attacked in such cases as the above. Where the disease is associated with caries of one or more ribs the processes are more likely to be affected, and are in all probability the portions reached by the finger and the curette of the surgeon. Dr. Agnew and I have had one such case, in which caries of the vertebral extremity of the third rib was the cause of an enormous cold abscess occupying the whole of the right scapular region, and in which we curetted the process, *not* the body of the corresponding vertebra.

Three principal objections have been made to attempts to reach the focus of bone-disease in these cases of spinal abscess:

1. It is said that operative methods practicable upon the cadaver cannot be employed in the presence of the angular deformity of Pott's disease, in which the last rib may be in actual contact with the ilium. These cases, however, are rare, and in them there is little indication for surgical interference, as the bodies of many vertebræ are deeply affected. The favorable cases are those of superficial caries, in which there is a curve of very large radius, or those in which there is disease of but a single vertebra and a very slight angular projection. In these two classes of cases the costo-iliac space is but little reduced.

2. It is said that the solidity of the spine is affected by operation. This, of course, cannot apply to cases in which curetting is employed. It is scarcely possible that the removal of a sequestrum could materially affect the integrity of the spine; and indeed this has not occurred even after very extensive removal of portions of vertebræ.

3. Operation is said to be useless. As a matter of fact, we have now the records of fourteen operations upon the bodies of vertebræ, with eight cures, five cases improved, and one death, which had no relation to the operation itself. From these facts the following conclusions seem justifiable:*

The search for the focus of bony disease in caries of the spine is indicated with sufficient frequency to give the matter a real surgical interest. The posterior arch is accessible at all levels. The seat of disease may be sought in exceptional cases even before the appearance of an abscess, and in the presence of an abscess may be reached with great ease and certainty. The bodies of the lumbar vertebræ are accessible by Treves's operation even when no abscess which is clinically appreciable is found. If an abscess exists, even when it points anteriorly, it is proper to open it by the lumbar route and seek the focus of disease. If it points in the loin, it should, of course, be opened in that region. The lumbar incision permits us, if the abscess depends on vertebral disease, to reach, without wounding the pleura, the twelfth dorsal vertebra, and even occasionally to go above it. The eleventh dorsal is usually, in my opinion, not to be reached with safety, and, unless extensive caries of the ribs has taken place, the bodies of the other dorsal vertebræ are not to be approached surgically even in the presence of an abscess.

As to the third indication in tuberculosis of the spine,—viz., the relief of cord-pressure in Pott's paralysis,—we have some encouragement to operation held out in the clinical facts:

1. That there are very many examples of the relief of paralysis in spinal caries after the pointing of a psoas or an iliac abscess, or after the evacuation of pus by the side of the spine. It is scarcely worth while to give special instances of the truth of this statement. It is familiar to all who have seen many cases of

* They differ somewhat, but not materially, from those reached by Chipault.

Pott's disease. Of course in such cases the evacuation of the abscess when it is accessible, or the performance of Treves's operation for the removal of the carious portion of the vertebræ, is clearly indicated.

2. That the disease of the dura mater in Pott's disease is limited to the site of the diseased vertebræ. The change from an inflammatory to a normal area is an abrupt one. Dr. George R. Elliott, in a valuable paper on the "Pressure Paralysis of Pott's Disease" (*N. Y. Medical Journal*, June 2, 1888), has fully developed this point, long ago advanced by others, in an argument to sustain the theory that this paralysis is due chiefly, almost entirely, to pressure, and not usually to grave changes in the cord itself. Some of his conclusions, sustained by autopsies in twenty-one cases, have a direct bearing upon the question and may be found subjoined.*

That these statements, at least so far as they attribute the paralysis of Pott's disease to an external pachymeningitis rather than to direct pressure from the bones themselves, are not new ones, a few quotations will demonstrate. Hippocrates, writing of spinal cases, said,—

"The palsy of the legs and arms, the wasting of the body, and the retention of urine happen chiefly in those cases where there is no spinal deformity, nor any projecting bone forward or backward; and paralytic affections take place the least frequently in cases of gibbous or angular projections."

Mr. Percival Pott, writing in 1720 on "The Useless State of the Lower Limbs in Consequence of a Curvature of the Spine," says,—

"Since I had been particularly attentive to the disorder, I thought that I had observed that neither the extent nor degree of the curve had in general produced any material difference in the symptoms, but that the smallest was, when perfectly formed, attended with the same consequences as the largest, and that the useless state of the limbs is by no means a consequence of the altered figure of the spine, or of the disposition of the bones with regard to each other, but merely of the caries."

Michaud, in 1871, completely elucidated the mechanism of this form of paralysis ("Sur la Méningite et le Myélite dans le Mal vertébral"), and Buzzard (*Transactions of the Clinical Society of London*, vol. xiii., 1880), Gowers ("Diseases of the Nervous System," 1886, vol. i. p. 169), and others have, by autopsies and carefully reported cases, confirmed these views.†

On May 9, 1883, Mr. William Macewen, in a case of complete sensory and motor paraplegia, with incontinence of urine and fæces, and of two years' duration, the result of angular curvature of the spine, removed the laminæ of the fifth, sixth, and seventh dorsal vertebræ. Between the theca and the bone he found a fibrous neoplasm one-eighth of an inch in thickness firmly attached to about two-thirds of the circumference of the membranes; this was carefully dissected off; twenty-four hours later improvement began, and in six months the patient was able to walk. In five years afterwards he was attending school and joining in all the games, including foot-ball. Mr. Macewen's cases of paraplegia in Pott's disease included four others, two of which were successful, one of them being of the most aggravated character imaginable. A third case was also successful. The two fatal cases died, one a week after the operation, the other eight months later, of general tuberculosis.

Recently Mr. Horsley has operated upon a case of complete paralysis of all four limbs from caries of the second and third cervical vertebræ, and reported the case as rapidly regaining power. The wound healed without the slightest complication.

In December, 1888, I operated upon a paraplegic patient with Pott's disease and angular curvature. The patient had grave visceral lesions, which, together with the shock of the operation, caused his death. The autopsy disclosed the existence of tubercular disease of both lungs; amyloid kidneys; a large tubercular mass undergoing softening, and connected with the bodies of most of the dorsal

* It seems to him demonstrated: That we have present a simple mechanical pressure in the form of abscess products, thickened dura or bone; that the inflammatory process is invariably a limited one, the inflammation of the dura mater being restricted exactly to the site of the diseased vertebræ, exhibiting no tendency to extend in the membrane,—nature's medullary protection; that the medullary surface of the dura mater is almost invariably normal. It follows, then, that the pressure lesion is simply mechanical, possessing no tendency to involve the spinal cord through any inherent specific characters of the carious process—a bland mechanical lesion—and the damage it inflicts is commensurate with the pressure exerted.

Experimental physiology gives no evidence of an inflammatory lesion following experimental compression of the cord. A careful examination of the pathological findings of reported cases reveals to us, in the light of recent pathological knowledge, but few instances where we have reason to believe the original lesion to have been inflammatory. These were cases where the process was virulent, leading to a perforation of the dura mater, thus allowing the purulent products to come in direct contact with the cord, giving rise to a lepto-meningitis.

Finally, then, Dr. Elliott concludes, our researches have led to the belief that the original lesion is, as a rule, non-inflammatory, an opinion supported by pathology and experimental physiology, and corroborated by clinical manifestations.

† "Pachymeningitis, with or without suppuration, is generally due to traumatism or vertebral caries, but occasionally cases appear to arise as primary or idiopathic. In this so-called idiopathic suppuration in the spinal dura mater, trephining low down to give exit to the pus might in rare cases prove a useful procedure. Such a case is that reported by Dr. Robert Maguire (*Lancet*, July 7, 1888). Other cases have been reported by Mueller, Spencer (*Lancet*, June 14, 1879), and others." (Charles K. Mills, "Spinal Localization," THERAPEUTIC GAZETTE, May 15 and June 15, 1889.)

vertebræ and with a patch of softened lung-tissue. The cord was normal, except at the level of the eleventh dorsal vertebra, where it was soft. The dura and peri-dural tissues were normal.

Microscopical Examination of Cord.—This proved to be exceedingly interesting, especially in view of the conclusions of many surgeons and neurologists formulated by Elliott, who argue against the occurrence, or at least the frequent occurrence, of inflammation of the cord as a result of compression in Pott's disease. In the first place, the cord showed no alteration in shape, nor did there appear to be any change in the pia mater. A very striking

FIG. 1.

Trans-section of lumbar cord, showing hemorrhagic infarct ("Annals of Surgery"). (Drawn by Allen J. Smith.)

change, however, existed in the gray matter. Here extensive hemorrhagic infiltration had taken place. It was marked on both sides, but especially so on the left; nor was it absolutely confined to the gray matter; here and there the white matter had been invaded. It was of interest to note that this condition was relatively recent. The stage was still that of *red* softening, and little, if any, change had taken place in the blood-corpuscles. There were no indications of long-standing and chronic inflammatory changes. In the cornua of the gray matter the nerve-cells were quite well preserved; the nerve-tubules of the white matter likewise presented a normal appearance, and there was no noticeable increase in the neuroglia. Further, it was most marked in sections made from the upper portion of the fragment,—namely, that which had undergone most compression.

I may quote my remarks published at the time the case was reported:

"The result was a surprise and great disappointment to me. So little interference with both bony and nervous structures had occurred; the patient was so young; his general appearance was so good, and his nutrition so excellent, that my prognosis, based also on the reports of the attending physicians and neurologists, was very favorable, as regarded the immediate effects of the operation. The autopsy, of course, disclosed a condition, or rather a series of conditions, that went far both to explain the fatal result and to render it less distressing, as the case was evidently a hopeless one. Either the spinal abscess or the pulmonary tubercle would have strongly contraindicated operation had their existence been revealed by persistent fever or sweats, by cough or emaciation, or by physical signs. In the absence, however, of these, and of all other significant symptoms, and in the presence of a spinal deformity which seemed to point strongly to a pressure paraplegia, the operation seemed justifiable.

"The immediate cause of death, I am disposed to believe, was a combination of shock with the free use of ether in a patient with crippled lung-power, a degenerated heart-muscle, and amyloid kidneys. There was no hemorrhage of any moment, and indeed the quantity of ether administered was not excessive as compared with that used in every-day operations on ordinary patients.

"The chief lessons of the case are: 1. The apparently unavoidable risk due to insidious and unrecognizable complications, a risk which is probably greatly increased in tuberculous patients. 2. The existence of red softening in a case of Pott's paralysis, a condition which, if we can judge by recorded autopsies and by the expressed opinion of many competent observers, is very exceptional. 3. The necessity for extreme caution in the use of anæsthetics in all cases in which the existing and recognized disease makes coincident visceral changes probable, or even possible."

Dr. Robert Abbé, of New York, has (*Medical Record*, February 9, 1889) reported a case which he describes as an extra-dural tumor of the spine, but which seems to have been a case of caries of the dorsal vertebræ followed by localized suppuration with inflammatory thickening and desiccation of pus, rather than a tumor, causing caries by pressure. In this case the spines and laminæ of the eighth, ninth, and tenth dorsal vertebræ were cut away by the rongeur, and the mass of dense tissue above the spine removed. The patient made a rapid recovery, regaining the ability to walk while pushing a chair. In another case of intractable brachial neuralgia the laminæ of the vertebræ from the fifth cervical to the third dorsal were removed on the right side, and the posterior roots of the sixth, seventh, and eighth cervical nerves were divided. The patient made a quick recovery.

Mr. Duncan has reported (*Edinburgh Medical Journal*, March, 1889) a case of paraplegia of nearly a year's standing, and due to Pott's disease, relieved by the removal of the spines and laminæ of the fourth, fifth, sixth, and seventh dorsal vertebræ.

Mr. W. Arbuthnot Lane reports (*British Medical Journal*, April 20, 1889) a case of Pott's disease with angular curvature in a child aged 7½ years. The curvature was about the middle of the dorsal region. For eleven months he had been paralyzed. The spinous processes and laminæ of the fourth, fifth, and sixth dorsal vertebræ were removed with bone forceps. The body of the fifth appeared abnormally near the laminæ of the adjoining vertebræ, and the cord seemed to have been forcibly compressed between those bony points. The wound healed under two dressings. A month later he was able to move both legs freely, and at the time the case was reported seemed on the road to recovery.

The cases of Macewen give strong corroborative evidence in favor of the theory of extradural pressure rather than interstitial cord change as the cause of the paraplegia in these cases, as does that of Horsley, the cord recovering there from the effects of the pressure of the tumor, which had been exerted with sufficient firmness, and for so long a period, as almost to hemisect it. Duncan's case and Horsley's other case (of Pott's paralysis) are also valuable evidence in the same direction.

Resection of portions of the body of a vertebra has been performed in paralytic cases on the sixth and seventh cervical vertebræ by Podres (*Russkaja Med.*, No. 19, 1886), with recovery; on the dorsal vertebræ by Boeckel, with excellent results (*Schmidt's Jahrbücher; Phila. Med. Times*, September 8, 1883). James Israel (*Berliner Klin. Wochenschrift*, March 6, 1882) resected the arch and body of the last dorsal vertebra for caries and spinal abscess. The patient died of coincident tubercular disease on the thirty-seventh day.

Dr. John A. Wyeth has reported a case of a boy 9 years of age with Pott's disease affecting the mid-dorsal region, with paresis of the bladder and complete paraplegia of the voluntary muscles of the lower extremities. Sensation was not disturbed. A plaster jacket was applied while the patient was suspended. Four months after his admission there was no improvement. As a result of catheterization to relieve retention of urine a severe urethritis and cystitis ensued, for which supra-pubic cystotomy for drainage was done. Six months after admission, as it had been determined to explore the vertebral column, the spines and laminæ of the third, fourth, fifth, sixth, and seventh dorsal vertebræ were exposed by a median single incision, and the skin and muscles were lifted together from the bones. The laminæ of the fourth, fifth, and sixth vertebræ were divided on each side, and, with their spines, were removed. The dura was very tense immediately beneath the right lamina of the fifth vertebra, and bulged out well beyond the level of the bone which had just been removed. On opening the dura, a sharp prominence occupying the right half of the posterior portion of the cord was observed. It was about half an inch in perpendicular measurement. On puncture, a creamy substance escaped, to all appearance like thick pus. About thirty minims were evacuated, and the tumefaction was entirely relieved. The dura was closed with fine catgut sutures, and a moist aseptic dressing was applied. The patient made a good recovery, but up to five weeks after the operation there had been no improvement in the paralysis. The bladder-drainage was being continued. The fluid from the abscess consisted chiefly of broken-down cord substance, with a few leucocytes. The case was evidently one of compression of the cord from Pott's disease (*New York Medical Journal*, 1890, vol. li. 1, p. 271).

Dr. Wyeth reported later that his patient was able to sit upon the side of the bed and make some steps. At the same meeting Dr. Abbé reported the case of a young adult having complete paraplegia due to a similar neoplasm compressing the cord. Three weeks after operation the patient began to walk, and was finally cured (*New York Medical Journal*, 1890, vol. li. 1, p. 271).

Mr. Henry Thompson reports a case of recent paraplegia following caries of the vertebræ at the cervico-dorsal junction. The paralysis was very extensive, extending up to the arms, and the patient was steadily deteriorating. The spines and laminæ of the last cervical and the first and second dorsal vertebræ were removed. The dura mater at first looked compressed and did not pulsate, but in a few minutes it seemed to do so. There was no appearance of any cicatricial or inflammatory tissue, but the bodies of the affected vertebræ seemed to be compressing the cord. It was not thought necessary to open the sheath, so the wound was stitched up, covered over with protective and a thick layer of boracic acid powder, and upon that a layer of alembroth wool was placed. A small drainage-tube was inserted before the wound was sutured. For some days he was very ill, although the tympanites almost immediately began to disappear; but after he had got over the shock of the operation he gradually but steadily improved. At the time of the report he had so greatly improved that it was thought he would entirely recover (*London Lancet*, 1889, ii. pp. 315, 316).

In July, 1888, Dr. John B. Deaver operated upon a patient of Dr. Hendrie Lloyd's who had a swelling involving the left lateral region of the cervical spine, which was thought to be a tumor extending outward from the spinal canal. She had paresis of the left arm, paralysis of the left leg, exaggerated reflexes, etc. There was no paræsthesia and no anæsthesia. At the operation the laminæ of the third and fourth cervical vertebræ were cut through, but nothing abnormal in the cord or membranes was found. The cord was explored with a needle. During the latter part of the operation the respiration altered, and continued to be gasping and irregular at intervals until her death, three days later. At the autopsy there was found an old extravasation of blood, with advanced degeneration, a short distance below the decussation of the pyramidal tracts. Death was thought to be due to phrenic inhibition the result of the exploration (*Amer. Journ. of the Med. Sci.*, December, 1888, p. 564).

Mr. G. A. Wright reports a case of a child 7 years of age with Pott's paralysis. The angular curvature was most marked in the mid-dorsal region. An incision about four inches in length was made along the line of the most prominent spinous processes, and the soft parts on each side were separated so as to expose the osseous surfaces. Three laminæ were divided on each side, and were removed with their attached spines, uncovering the theca of the spinal cord, which, at the lower part exposed, was found surrounded by a buff-colored, tough, leathery substance; this was cut away with scissors. The cord did not appear to pulsate, but no point of constriction could be found. The muscles were brought together by deep sutures of catgut, and the skin with waxed silk; a small drainage-tube was left in. The wound, having been dusted with iodoform and boracic acid in equal parts, was dressed with sublimated wool wadding. Careful antiseptic precautions were observed before and during the operation. The trunk was supported by a special iron splint. The wound healed rapidly by first intention, except at the drainage-opening, which, however, also quickly closed; very slight improvement was soon followed by relapses (*Lancet*, 1888, ii. pp. 64–66).

M. Buffet reports a case of tuberculous ostitis of the lumbar vertebræ in which he divided the articular processes and the sides of the bodies,—effecting a

twelve hundred cubic centimetres will kill twenty-four kilogrammes of hare. Our man weighs sixty kilogrammes, and secretes urine enough to kill in twenty-four hours twenty-four kilogrammes of hare. We have only then to determine by a simple rule of three how much one kilogramme of man fabricates in twenty-four hours available for killing one kilogramme of hare. You will obtain as an answer, four hundred grammes.

Hence the quantity of urinary poison which one kilogramme of man can furnish in twenty-four hours to kill one kilogramme of living animal is forty cubic centimetres. This is almost the normal figure, which is about forty-six cubic centimetres. But in the pathological state it oscillates between two and ten cubic centimetres. As you see, we may define thus the coefficient of toxicity; it is the quantity of toxic matter which the unit of weight produces in a unit of time.

In the physiological state this urotoxic coefficient presents certain variations. It is not the same during the waking hours and during sleep. During sleep, man eliminates from two to four times less poison than during the period of cerebral activity. The urine of the day and of the night has not the same toxic effects. Thus, while the urine secreted during sleep is convulsivant, that secreted during the waking hours has no such property, but produces narcosis. From this fact a new theory of sleep has been broached,—namely, that this physiological act is determined by the accumulation of toxines producing narcosis.

But let us return to our subject, and apply these data to the study of the *rôle* of the liver as a destroyer of poisons. In a large number of observations, which you will find reported in their entirety in the thesis of Roger,* in which he has studied the toxicity of the urine in patients suffering from hepatic affections, this experimenter has in the immense majority of cases found a notable augmentation of the urotoxic coefficient; this might have been expected, since the suppression of the physiological functions of the liver entails the disappearance of its destructive action on the animal toxines.

But now that this first fact has been determined, we must admit that, from a clinical point of view, it can furnish us but uncertain data, and this is true for numerous reasons: first, because such researches belong much more to the domain of the laboratory than to that of clinical medicine; and if at a recent competitive examination for the election of graduates to fellowship there were placed at the disposal of the competitors a patient, a laboratory, and a hare, it must be conceded that many physicians would be embarrassed if they were obliged in their daily practice to resort to experiments on the hare as a means of diagnosis.

But in admitting even that this fact remains simply an experimental curiosity, it only furnishes information respecting the antiseptic functions of the liver which is absolutely uncertain, because in most diseases of the liver there is icterus and derangement of the biliary secretion. As I shall tell you when I come to speak of the liver as a biliary organ, the bile is much more toxic than the urine, and while it takes forty-five cubic centimetres of urine to kill one kilogramme of living matter, it only takes five cubic centimetres of bile to obtain the same result; the bile is, then, nine times more toxic than the urine. Hence it is that if all the bile were to pass directly into the blood, a man would be poisoned in eight hours and fifty-five minutes; while if the urine of one day were to be reabsorbed, death would not take place in less than two days six hours and thirty-two minutes. Hence, then, according as the bile is secreted or not, the urotoxic coefficient will considerably vary, and for this reason this means of research loses its value if we wish to apply it to the test of the integrity of the antiseptic functions of the liver. Therefore, as you see, we can obtain by the methods which I have just enumerated only hints as to the state of the hepatic cell from the point of view of its destructive action on poisons, and if these hints lack precision, they enable us, nevertheless, to a certain extent, to affirm whether the liver is performing its functions well or badly.

I recommend to you especially the spectroscopic examination of the urine, which enables you to detect the presence of urobilin. And if the result proves negative, you can employ the method of experimental glycosuria, or the test for the toxicity of the urine.

I pass now to the therapeutic conclusions which are derived from the facts which I have just presented.

In diseases of the liver and in infectious diseases, whatever may be their origin, the therapeutist has the greatest interest in maintaining in its integrity the destructive power of the liver on toxines, and he should even

* "On Alimentary Glycosuria" (*Revue de Médecine*, October, 1886).

endeavor to augment it. To attain this there are two orders of means: 1. To augment the glycogenic functions of the liver, since, according to physiological experiments, there is an intimate correlation between the glycogenic functions and the antiseptic functions. 2. To restrain, as far as possible, the sources of poisoning of the organism, so as to reduce to its minimum the quantity of toxines which the liver must destroy.

Let us examine each of these points; and, first of all, the means for augmenting the glycogenic function of the liver.

We know, and I shall insist on this point in another lecture, that the glycogenic functions of the liver are depressed by abstinence and by hyperthermia.

If abstinence, or the withholding of food, be sufficient to diminish glycogenesis, we see the necessity of sustaining fever patients and those that have hepatic diseases by a diet as restorative as possible. It is well understood that this alimentation should fulfil certain conditions, to which I shall return in a moment when I come to the second point of the question which I have to treat,—*i.e.*, the suppression of the causes of the poisoning of the organism; we shall see, in fact, in this connection, that food is one of the most active sources of this poisoning.

To the necessity of feeding the fever patient is joined another necessity,—that of bringing down the temperature. Hence, then, from the exclusive point of view of the antiseptic functions of the liver, we must combat the hyperthermia. You know that we can attain this end by cold baths or tepid baths, or by the employment of that group of medicaments which are derived from the aromatic series. But these medicines have the great disadvantage of diminishing the secretion of urine, and thereby the excretion of toxines.

In his experiments, Roger seems to have demonstrated that glucose by itself modifies the toxicity of the vegetal or organic alkaloids. We may even draw this other conclusion,—that sugar, and glucose in particular, may be utilized advantageously in the infectious diseases, and that it is a good thing to sweeten the drinks of patients that have these affections. But this is a point that needs further study.

But of more practical importance is the great question which I am now to take up,—viz., how to restrain within the narrowest limits the sources of infection of the economy. Whenever we have to deal with an affection of the liver, of whatever nature, this indication forces itself upon us.

In the previous lecture I showed you that the animal toxines have four sources. They come from foods introduced into the digestive tube; they result from fermentations, which there take place at different stages of the digestive process; they are secreted by the microbes, which abound in the intestinal canal; lastly, they result from the activity of the cell-life.

To these four origins it is necessary to add a fifth, which is of pathological or, it may be, of therapeutic origin. Those of pathological origin are the toxines fabricated by the microbe that causes the infection, and constitute that class of diseases to which I have given the name of toxi-infections. Those of therapeutic origin are the alkaloids which we administer with curative intent.

From this particular point of view, in all patients suffering from affections of the liver, it is necessary to be very chary in the use of alkaloids introduced by the digestive tube, and, in particular, of certain of them such as morphine, atropine, and quinine, and to employ in preference the hypodermic method, because, in accordance with what I have said in a previous lecture, it remains demonstrated that the liver, having a special destructive action on these vegetable alkaloids, when this organ is diseased this destructive action no longer exists; and one is then quite likely to see supervene toxic accidents with therapeutic doses of these alkaloids introduced by the mouth.

As for the other causes of infection which I have above enumerated, we can combat or attenuate them by three orders of means:

1. By the practice of intestinal antisepsis.

2. By favoring the channels for elimination of the toxines.

3. By diminishing cellular activity.

Let us study each of these means.

Intestinal antisepsis, which constitutes the basis of this special medication, includes,—1, antiseptic medicaments; 2, purgatives; 3, a special dietetic regimen. At the head of antiseptic medicaments, we must place salol and salicylate of bismuth. Already, in a former number of the THERAPEUTIC GAZETTE, I have mentioned the reasons which have led me to consider salol as the best intestinal antiseptic. For instance, salol is but little irritating, being always well tolerated by the di-

cervical lesion except my own, in which case the equally fatal condition of tuberculosis of a large number of vertebral bodies existed.

The effect of suspension in the treatment of Pott's paralysis has been so favorable in a number of cases that it should occupy a prominent position in the consideration of our therapeutic resources, and should always be tried, or, at least, carefully discussed, before operative measures are thought of.

Weir Mitchell (*Amer. Journal of the Med. Sciences*, May, 1889), has, it appears to me, shown conclusively: That suspension should be used early in Pott's disease; that used with care it enables us slowly to lessen the curve; that in these cases there must be in some form a replacement of the crumbled tissues; that no case of Pott's paralysis ought to be considered desperate without its trial; that suspension has succeeded after failures of other accepted methods; that the pull probably acts more or less directly on the cord itself, and that the gain is not explicable merely by obvious effects on the bony curve;* that the methods of extension to be used in these cases may be very various, only provided we do get active extension; that the plan and the length of time of extension must be made to conform to the needs, endurance, and sensation of the individual cases.

I desire merely to express my concurrence with these views, and shall not further pursue this branch of the subject.

The evidence at present available in relation to the operative treatment of spinal tuberculosis with symptoms of pressure upon the cord appears to me to justify the following conclusions:

1. The paralysis in Pott's disease is not, as a rule, due to a transverse myelitis or a hopeless degeneration, and is not usually due to the pressure of the carious or displaced vertebræ, but is, in the majority of cases, the result of an external pachymeningitis, which results in the formation of an extra-dural connective-tissue tumor.

2. Speaking generally, a favorable prognosis is to be given, especially in children, in cases of Pott's paralysis in which the abscess, if any exists, can be evacuated; the treatment by extension and with a plaster jacket can be employed, and the patient can be put under the most favorable hygienic conditions.

3. In cases in which all this has been tried unsuccessfully, or in those in which the disease is slowly but steadily progressing to an unfavorable termination; when with more or less complete loss of motion and sensation below the level of the lesion there are incontinence of urine and fæces and the development of bed-sores, and especially when acute symptoms threaten life, resection becomes entirely justifiable.

4. Operation having been decided upon for any or all of the above reasons, the prognosis will be favorable in direct proportion to the youth and strength of the patient, the absence of generalized tuberculosis, and the nearness of the lesion to the base of the spine.

5. When the tuberculous process affects the arches and there is paraplegia, we may sometimes operate, hoping not only to free the cord, but to remove at the same time the focus of disease. This double indication may also be fulfilled in those cases where, without bony disease, there is posterior pachymeningitis or a tuberculoma occupying the canal. Here again, however, time and careful attention to hygiene, including change to sea- or mountain-air, often work wonders.

6. If the lesion of the bodies of the vertebræ is in the lumbar region at a point where these bodies are accessible, it might be possible in certain cases to expose the cord from the back, by removal of the laminæ, with the object not only of removing pressure but of reaching and taking away the diseased bone and tubercular granulation.

7. In tuberculosis of the body of a vertebra and compression of the cord by anterior pachymeningitis we can fulfil only one indication,—liberate the cord from pressure. We should operate only in grave cases where acute compression, the appearance of respiratory complications, the rapid development of degenerative processes, force us to interfere, or where the course of a chronic case is steadily towards a fatal termination although no advanced visceral tuberculous lesions are present.†

C. Passing now to the third group of cases, and taking up the surgery of the neoplasms of the cord unassociated with traumatism or caries, we may very briefly review the history.

In fifty cases of spinal tumor tabulated by Drs. Mills and Lloyd, and among fifty cases tabulated by Horsley, the two including practically all those of which we have any satisfactory knowledge from the surgical and pathological stand-points, no mention is made of operation in a single instance.

In 1882, Mr. Byron Bramwell, of Edinburgh, in his work on "Diseases of the Spinal Cord," made the following important suggestion in regard to this subject:

* Dr. G. F. Jydston suggests ("Addresses and Essays," Chicago, 1891) that the elongation of the spinal canal produces a vacuum, which causes an increased vascular supply to the cord with a corresponding increase in its ...on.

† Chipault, *op. cit.*

FIG. 2.—POSTERIOR VIEW OF PATIENT, SHOWING CICATRIX. ("Annals of Surgery.")

FIG. 3.—LATERAL VIEW OF PATIENT, SHOWING ATTITUDE AND GAIT. ("Annals of Surgery.")

"The removal of extra-medullary tumors is not yet a recognized plan of treatment. This is partly owing to the uncertainty of diagnosis, and partly to the serious nature of the operation. The difficulties in diagnosis are disappearing, and, thanks to antiseptic surgery, we can now conduct operations which were formerly unjustifiable. I would advise an operation in any case in which the symptoms were original, in which the diagnosis clearly indicated the presence of a tumor, in which there was no evidence of malignant disease, in which the exact position of the growth could be localized, and in which a vigorous anti-syphilitic treatment had failed to produce beneficial results."

Other neurologists, notably Mr. Gowers, expressed the same general views; but the strong prejudice existing among surgeons against the operation of resection, and the uncertainty of diagnosis on the part of the neurologists, combined to prevent operative interference in such cases, patient after patient perishing without even an attempt at treatment.

In June, 1887, Mr. Victor Horsley operated upon a case, the symptoms of which had begun immediately after a severe traumatism in 1884, and were thought to indicate an intercostal neuralgia, localized beneath the lower part of the left scapula. For a long while the pain was the only marked symptom, but in February and March, 1887, there came on distinct loss of power in both legs, and by June the symptoms were those characteristic of a transverse lesion of the cord a little above the middle of the dorsal region.

Mr. Horsley operated very much after the method employed many years previously by Gordon, McDonnell, Hutchison, and others, trephining the laminæ of the fifth vertebra after having first cut off the fourth, fifth, and sixth dorsal spines. After the removal of the trephine button, the rest of the laminæ of the fourth, fifth, and sixth vertebræ were then taken out by means of the bone-forceps and knife. The dura was opened, but nothing abnormal was discovered. The third and seventh laminæ were then removed, and finally the lamina of the second dorsal vertebra, disclosing an oval or almond-shaped tumor, which subsequently proved to be a fibro-myxoma. This was easily removed, when the lateral column on that side was found to be so notched by pressure that the bottom of the groove nearly reached to the middle of the cord. The patient made an excellent and fairly rapid recovery, and one year later was able to do a day's work of sixteen hours, including much standing and walking about.

In October, 1888, I operated on a case of paraplegia thought to be due to focal spinal lesion, possibly to a tumor, in a patient of Dr. F. X. Dercum's. The case will be found reported very fully in the *Annals of Surgery* for June, 1888. Although no tumor was found, the removal of peri-dural connective tissue which had undergone some thickening, and the separation of subdural adhesions were followed by very marked improvement in sensation and mobility, which improvement has gone on to entire recovery.

On December 25, 1887, he was attacked with severe pains in the arms and shoulders, burning and shooting in character and attended by pain on motion, but no loss of power. He described it as rheumatism.

Three or four days later, however, he noticed distinct weakness of the thighs. This weakness increased and spread rapidly down the legs to the feet, and upward over the trunk as far as the breast, and, in the course of eight days, had deepened into absolute paralysis of the parts involved, including both sphincters. At the same time the paralyzed parts became the seat of profound anæsthesia. The latter extended up to the level of the nipples, at which point an intense girdle-pain made its appearance. A bed-sore, trophic in character, followed in time, and added to the patient's sufferings. All the reflexes of the legs, both deep and superficial, became exaggerated. Percussion of the spine elicited pain over the third and fourth vertebræ and to a less extent over the fifth. Flexion and torsion of the trunk also gave rise to pain in this region, while slight blows upon the head in the direction of the spinal axis gave rise to frightful exacerbations of the girdle-pain.

For upwards of ten months this man's condition had grown gradually worse, until the full development of his symptoms, as detailed, had been reached. His general health had suffered severely, and certainly the prospect of recovery was anything but hopeful. Internal therapeutics had been exhausted, and, after a consultation of the neurological staff, it was decided to trephine the spine. The operation was regarded as exploratory in character, though the symptoms pointed directly to a localized affection of the spine or of its immediate contents.

The fifth, fourth, third, second, and first dorsal spines and laminæ were successively removed, and the exposed dura, which seemed unusually thickened and resistant, was incised and opened for a distance corresponding to the length of the wound. The dura was found to be very adherent to the subjacent pia mater by numerous fine bands of new connective tissue, especially in the upper angle of the wound. These adhesions were separated with some little difficulty. The cord was then cautiously explored with the finger, but nothing further was found. The subsequent surgical progress of the case was all that could be desired.

A few hours after the operation, the effect of the anæsthetic having entirely passed off, the patient stated that the girdle-pain had entirely disappeared; nor did it at any subsequent time return. On the following day there was distinct though very slight return of sensation in the feet, and this steadily increased day by day. Errors of location as regarded the level of the impression, and allocheiria, were present and quite persistent. On the sixth day a barely discernible voluntary movement of the toes of the right foot was observed. Little by little a return of voluntary motion obtained, until some two months later, when he could distinctly move the feet and the muscles of the thighs. Sensation, too, steadily improved, allocheiria disappearing, a few errors of location being made. In addition the bed-sore had promptly healed, and some slight control had been regained over the sphincters. This was the patient's condition up to April, 1889. The operation had been performed October 17, 1888.

During the months of May and June the gradual and gratifying return of spinal functions continued, and by July very good control of the urinary sphincter had been regained. He was now capable also of extending and flexing the legs and thighs at will, and a little later he insisted on being raised to the sitting posture. About this time also his control over the bowel became more decided. His improvement continued unabated until the latter part of August, when he had the temerity to

attempt a few steps out of bed. He was, however, restrained in his efforts in this direction for some time longer, and his ambition limited to sitting up in a rolling-chair. In getting in and out of bed, however, he showed such a decided return of power that limited efforts at walking were soon permitted. His progress now was relatively rapid, and he soon learned to walk the entire length of the ward with the aid of a cane. At present he has completely recovered, and is now out of the hospital, earning his living by manual labor.

The technique of Horsley as to his successful case of spinal tumor has been followed in three other cases, once with success by Pescarole, who removed a subdural tumor compressing the cord from the second to the fifth dorsal vertebræ. In the other two cases, one, also of Horsley's, died of shock. Sonnenburg operated for a rapidly-developing sarcoma, which could not be completely removed. Death occurred in six weeks. Five other cases of trephining for tumor are as follows:*

Reydellet ("Dictionnaire des Sciences Médicales," vol. xxxiii. p. 564, 1819) exposed the cord by accident during the removal of a hydatid cyst. The patient died a year later, as a result of suppuration developed in the cyst. Athol Johnson (*Trans. Path. Soc.*, London, 1856–57, vol. viii. p. 16) removed from a child of ten months a congenital tumor, which proved to be a lipoma. It was at the level of the first sacral vertebra. A portion of the tumor was found later to be within the dura. This was not touched. The patient died in six weeks, of peritonitis. Wright (Thorburn, *op. cit.*) removed a portion of a fibro-sarcoma of the neck involving the brachial plexus and invading the spinal canal. The tumor lay external to the canal, but appeared to communicate with it by a diverticulum penetrating the third intervertebral foramen. The tumor was removed, but the operator merely curetted this tract. There was some improvement. Bardeleben (*Berlin. Klin. Woch.*, Nov. 4 and 18, 1889, Nos. 44 and 46, pp. 946 and 1004) removed a tumor adherent to the seventh and eighth ribs and to the vertebral arches, between which it penetrated. This portion appears to have been left undisturbed. Death occurred in a few hours, and at the autopsy a nodule was found lying upon the posterior portion of the dura mater and compressing the cord. Abbé has reported (*N. Y. Med. Record*, 1890, vol. xxxviii. pp. 85–92) a case of pressure paralysis from extra-dural sarcoma. The operation was performed after the symptoms had existed for eight months. He resected the arches of the eighth, ninth, and tenth dorsal vertebræ and completely removed the tumor. The patient died on the ninth day.

A sixth case, reported in the *Neurolog. Centralblatt*, by Laquer, was operated on by Rehan on account of loss of sensation in the lower extremities, abolition of the patellæ reflexes, continuous and severe sacral pain, etc. A small extra-dural lymphangeioma was found, compressing the cauda equina. It was easily removed. Two weeks later all pain had disappeared, and four months afterwards recovery was almost complete (*Med. and Surg. Reporter*, September 12, 1891).

Five cases of intraspinal section of the posterior roots of the spinal nerves for obstinate neuralgia have been reported. 1. Those of Abbé are summarized as follows: *a*. Intractable brachial neuralgia, nerve-stretching, amputation, and finally intra-dural division of the sixth, seventh, and eighth cervical nerves; no permanent recovery. *b*. Intractable brachial neuralgia; intra-dural division of the posterior roots of the sixth, seventh, and eighth cervical and first dorsal nerves; recovery; improvement (*Medical Record*, 1890, vol. xxxviii. 2, pp. 85–92). 2. Bennett reported (*Lancet*, April 27, 1889, i. p. 839) a case in which he had divided close to the cord the posterior roots of the first, third, fourth, and fifth lumbar pairs and first and second sacral nerves. The spasms from which the patient suffered continued, but the violent neuralgic pains disappeared. The man died in fifteen days, of cerebral hemorrhage. 3. Horsley has reported two analogous cases in the tract of the eighth and ninth dorsal nerves. The posterior roots of these two nerves were divided. There was slight improvement, but later involvement of other nerves. The second case was a boy 15 years of age. He suffered from violent pains, vaso-motor troubles, and atrophy in the region supplied by the nerves coming from the left path of the lower third of the cervical enlargement of the cord. The seventh and eighth posterior roots were divided on the left side. Cerebro-spinal fluid escaped for three weeks. There was considerable improvement. Chipault suggests that such operations as the foregoing can only be applicable to cases of exceptional gravity. In such cases their advantages are,—1, to limit with certainty the route of an ascending neuritis; 2, in cases of difficult diagnosis to permit of the exploration of the vertebral canal; and, 3, to limit the section to the posterior nerves, thus avoiding paralysis of the territory innervated by the anterior nerves.

We may now consider the possible indications for operation in this third group of cases, or those in which there is reasonable ground for suspecting the existence of a removable neoplasm. Naturally, this group will, more than any other, try the diagnostic powers of both surgeon and neurologist, and no broad view of the subject can be taken without a brief enumeration of the various sources of error. This will lead me upon ground properly belonging to the neurologist, but I may perhaps be pardoned if I give a brief outline of the general diagnostic points which it will be necessary to bear in mind before deciding upon or rejecting operative interference. In the first place, it will be requisite to determine whether the symptoms are due to pressure on the cord or to inflammatory or other changes involving primarily the structure of the cord itself. If, in a case of paraplegia, we have the history of a very gradual onset, beginning with pain and followed first by motor paralysis and then by sensory paralysis; the symptoms being irregularly unilateral; the pain having first seemed to be neuralgic or rheumatic and burning and shooting in character; if the pain and anæsthesia in the lower limbs ascend gradually from the soles of the feet towards the trunk; and if at the same time there is a constant dull ache in a distinct segment of the spinal column, accompanied by a feeling of weakness at that point, much heightened by

* Chipault, *op. cit.*

fatigue, we have a group of symptoms pointing strongly in the direction of a neoplasm. In addition, it would be found that at first the reflexes, both deep and superficial, were much exaggerated, becoming gradually lost as destruction of the cord with descending degeneration and wasting grew more marked, the abolition of the reflexes beginning, as in the case of the pain and anæsthesia, in the plantar region and passing gradually upward.

Later in the disease we have the development of spasms with clonus, most marked in the intra-dural cases. The same remark is true of the symptom of rigidity. Local nutrition is not usually impaired; tenderness of the spine on percussion when it occurs in the dorsal region appears to be lower than the tumor producing it; in the cervical region, according to Horsley, this generalization does not seem to hold so closely. The feelings of stiffness and weakness will usually be found to correspond to the position of the tumor. Lateral curvature of the spine is a secondary result of the tonic spasm of the spinous muscles, and therefore the concavity of the bend is on the same side as the growth. The pupils are not affected, except when the cord is pressed upon above the level of the second dorsal nerve.

The age of the patient, judging from Mr. Horsley's tables, throws but little light upon the diagnosis of tumor, as we find lipomata occurring at an average age of 2½ years, sarcomata at 18 years, echinococcus at 34 years, tubercle at 39 years, scirrhus and myxoma at 48 and 53 years. These figures apply to extra-dural growths. In the case of intra-dural growths we have tubercle at 18½ years, myxoma at 43 years, fibroma at 44 years, sarcoma at 41 years, psammoma at 51 years. It will be seen, therefore, that while age may be of use in eliminating certain forms of growth, as, for example, tubercle in intra-dural growths in persons beyond 30 years, it is of little value in deciding the general question as to the presence or the absence of a neoplasm.

This sketch of the principal symptoms makes a tolerably distinct clinical picture, but one which is, nevertheless, liable to great variation, and therefore difficult to differentiate from that of certain conditions of the cord, some of which are due to causes quite beyond the reach of operation.

The chief of these, with the most obvious diagnostic points, are as follows:

Spinal Hemorrhage: Intra-medullary.—Onset sudden; history of traumatism, or of disease associated with profound blood-changes; symptoms bilateral; pain in back; rapid disappearance of reflexes connected with the affected segment; spasms and rigidity and paralysis appear rapidly; girdle symptom; bed-sores; incontinence of fæces; retention of urine very early in case; rapid course; often fatal.

Extra-medullary.—Pains in limbs, spasms, etc., more marked; paralysis supervenes more slowly; course of case much slower and much more favorable.*

Pachymeningitis Externa, from Caries.—Common cause, caries of vertebræ; family history of phthisis, scrofula, or tubercle; personal history fair; patient weak

* "The diagnostic symptoms of meningeal hemorrhage, as given by Gowers and others, and according to my own experience, are as follows: 1, sudden and violent pain in the back, less or more diffused; 2, pain along the course of the nerves passing through the membrane near the extravasation; 3, abnormal sensations,—tingling, etc., and hyperæsthesia,—referred to the same parts; 4, spasm involving vertebral and other muscles supplied by affected nerves, and also sometimes the muscles supplied by the cord below the seat of the hemorrhage; 5, sometimes general convulsive movements; 6, sometimes spasmodic retention of the urine; 7, consecutive paralytic symptoms, but not usually complete paralysis.

"Some points of differential diagnosis between meningeal hemorrhage and extravasation into the substance of the cord should be borne in mind. Symptoms of irritation, such as pain, hyperæsthesia, paræsthesia, and spasm, in meningeal hemorrhage, are usually immediate or very early, and may precede paralysis, which is commonly not complete. In hemorrhage into the substance of the cord, paralysis may be very complete at first, or rapidly become so, and symptoms of irritation may be very largely wanting. Hemorrhage may, and not infrequently does, involve not only the membranes but also the substances of the cord, giving complex symptoms" (Chas. K. Mills, "Spinal Localization," THERAPEUTIC GAZETTE, May 15 and June 15, 1889).

"In some cases of intraspinal hemorrhage, whether primary or secondary, trephining might be performed in two places in order to make sure of a good result,—namely, at the supposed seat of the extravasation, and the lowest portion of the lumbar spine, where, as already indicated, much of the extravasated blood would gravitate. Kronlein, it will be remembered, has recommended that in cases of cranial meningeal hemorrhage two trephinings should be performed if one is not successful, and several cases of failure in trephining for intracranial hemorrhage have been reported which would have been successful had the second operation been performed. In like manner two trephinings of the spine, or a single trephining at the lowest possible place in the lumbar region, might prove successful where failure would otherwise result.

"The somewhat frequent occurrence of spinal hemorrhage with fracture of either body, spines, or laminæ of the vertebra must not be overlooked. The diagnosis of the exact height of the lesion and the decision as to trephining may often have to be settled negatively or positively through a consideration of the question of the probability of a double lesion in cases of accident,—namely, both fracture and hemorrhage. The fracture and the hemorrhage may be situated at different levels, or, if the hemorrhage occurs primarily at the seat of the fracture, it may find its way down the canal" (Chas. K. Mills, "Spinal Localization," THERAPEUTIC GAZETTE, May 15 and June 15, 1889).

and feeble; usually history of injury also; onset slow; first symptoms often rigidity of spine, with tenderness on pressure or on tapping top of cranium, or on flexion or rotation; muscular palpitation and weakness rather than spasms or paralysis; irregular hectic fever; characteristic deformity; spinal abscess; bladder and rectum rarely affected; emaciation.

Chronic Transverse Myelitis.—Frequently a history of acute myelitis; slow in onset; bilateral; first symptom apt to be an impairment of motion, ranging from paresis to absolute paralysis; increased reflexes; ankle-clonus; rigidity common, but paresis, contractions, etc., more marked than paralysis; pain in back and girdle symptom common; anæsthesia and paræsthesia proportionate to motor paralysis; bladder and rectum not greatly involved; slow course.

Primary Lateral Sclerosis, or Spastic Paraplegia.—Often attacks robust adults between 30 and 50; slow in its onset; bilateral; begins with a feeling of weight and weakness in lower limbs, preceded by a peculiar and characteristic gait; spasm chiefly of muscles of lower extremities; manipulation of those limbs throws them into tonic spasm; paralysis not very common early; paresis and rigidity are characteristic symptoms, together with arched spine during peculiar locomotion.

Hypertrophic Cervical Meningitis.—Symptoms affect chiefly the upper limbs, with upper part of spine and thorax; bilateral; marked pain and rigidity, involving all these regions; paralysis occurs in second stage, and affects first and chiefly arms, shoulders, etc.; no atrophy of lower extremities; no bed-sores; no bladder or rectal trouble.

Having decided in any given case that the symptoms are probably due to tumor, the interesting question whether it is intra-medullary or extra-medullary will still remain to be settled. The best general guide will be found in the fact that the symptoms of intra-medullary growths are chiefly those of motor and sensory impairment, while the extra-medullary growths produce much more markedly irritative symptoms, as, for example, pain, spasms, etc. In the presence of a paralysis of gradual development, preceded by long-continued signs of nerve-irritation, and with a distinct unilateral element, the transference of paralysis from one to the other limb having been effected slowly and after a considerable interval, the diagnosis of compression of the cord by some cause outside of its own structure would seem warranted. Aneurism might be excluded in the absence of the characteristic physical signs and of evidence of erosion of the spinal column; gumma would be accompanied by a history of syphilis, would often be associated with other and recognizable specific lesions, and would possibly yield to the use of iodide of potassium; a growth (cancer or tubercle) of the bodies of the vertebræ themselves usually causes a perceptible deformity. By attention to the points which I have mentioned, a reasonably correct opinion may be arrived at, but I would strongly advise that in no case should the surgeon undertake a spinal resection based on a diagnosis of tumor without having called to his aid a skilled neurologist and carefully studied the case with him. The same remark applies with even more force to the question of localization. The broad general principles long applied in cases of traumatism are of course equally applicable to tumors, but there are numerous refinements of modern diagnosis which belong especially to the province of the neurologist and which are of vital importance in selecting the site of operation in cases of supposed tumor. Horsley's experience in the patient of Dr. Gowers is ample evidence of the unavoidable uncertainty as regards the particular vertebra or vertebræ to be attacked, but there is every prospect that these diagnoses will become more and more scientifically exact in the near future. In the mean while I would refer the surgeon who desires carefully to study for himself this side of his cases to the articles referred to below.*

Having decided that the probability is in favor of the existence of a tumor, and having also fixed upon its probable seat, the surgeon is confronted with the important question of the advisability of operation; in other words, with the question of prognosis.

All the evidence which we now have points to extraordinary reparative power on the part of a cord which has simply been suffering from compression, and to an almost equally remarkable tolerance of operative interference. The material for finely-differentiated prognoses can hardly yet be said to exist, but in a general way it is safe to say that the diagnosis of tumor (if it be non-malignant) carries with it a reasonably favorable prognosis, which is strengthened if, in addition, the tumor is thought to be extra-medullary.

As a result of the above considerations it seems to me proper to conclude that every case of focal spinal lesion thought to depend

* Seguin, "Localization of Spinal Lesions" ("Pepper's System of Medicine," vol. v. p. 77); Starr, "Localization of Functions of the Spinal Cord" (*American Journal of Neurology and Psychology*, vol. iii., 1889); Gowers, "Diseases of the Nervous System," vol. i. p. 142; Thorburn, *The Medical Chronicle*, April, 1889, p. 1, and the *British Medical Journal*, December 22, 1888; "A Contribution to the Surgery of the Spinal Cord," 1890; Ranney, "The Applied Anatomy of the Nervous System," p. 355; Ross, "Diseases of the Nervous System," p. 356; Charcot, "Localization of Cerebral and Spinal Disease;" Bramwell, "Diseases of the Spinal Cord;" Mills and Lloyd, "Pepper's System of Medicine," vol. v.; Mills, "Spinal Localization" (THERAPEUTIC GAZETTE, May 15 and June 15, 1889).

on a tumor and not distinctly a malignant and generalized disease should be regarded as amenable to operative interference, no matter how marked or how long continued the symptoms of pressure may be.

D. The last group of cases, those of spinal traumatism, is extremely interesting when viewed from the operative stand-point.*

Operation in cases of injury was suggested as far back as the days of Paulus Ægineta, who taught that in spinal fracture the surgeon must, if possible, attempt to extract the compressing bone by incisions, having first warned the patient of his danger (Adam's translation). Ambrose Paré in the presence of paralysis made a like recommendation. Heister advised removal of any fragment that pressed on the cord. In addition, Hildanus, Matz, and Vigaroux all referred to the operation, though none of them preferred it, while Heine, Roux, Holscher, and Dupuytren each removed portions of the vertebræ for disease. Malgaigne says Chopart and Desault are the first to speak of it as a very simple thing "to trepan between the spinous and transverse processes, to give issue to effused fluids or to elevate or remove pieces of bone which may wound the cord;" but it is not recorded that their suggestions bore any fruit, and a long interval elapsed without further mention of the subject. Dr. James, in his "Medicinal Dictionary," London, 1745, said (in almost the same language employed by Heister),—

"If the spinal marrow is wounded, death follows inevitably. Though as it may seem cruel not to attempt the relief of one under these unhappy circumstances, the surgeon should lay the injured part bare by the knife, and elevate the fragments, which press upon the medulla, in a proper manner; then let him cleanse the wound thoroughly and apply balsamic medicines, using the napkin and scapulary. He must continue this until the wound heals or the patient dies."

The nearest approach to a formal resection of the spine at about this date was the operation of Louis in 1762, reported in the *Arch. Générales de Méd.*, 1836, vol. ii. p. 417, and performed upon M. de Villedon, captain in the regiment of Vaubecourt, who was paralyzed from a gunshot wound of the back, received at the battle of Aménébourg. Louis and Duplessis consulted on the third or fourth day. They withdrew fragments of bone. They also spoke of "the indication for the trephine, even without fracture, to give exit to blood or matter, or even to prevent suppuration in some cases of fracture." M. Villedon recovered and was finally able to walk. Louis concludes, "Quoi qu'il en soit, c'est une victime que l'art a soustrait à une mort certaine."

The formal operation for the removal of a depressed vertebral arch was, however, first performed by the younger Cline, in the spring of 1814, and, though unsuccessful, showed the practicability of such an operation; Cline considered (South's Notes to Chelius's Surgery) that the symptoms sometimes resulted from the pressure of the spinal cord by the spinous process or arch of the displaced vertebra, either fractured or not, a condition which he thought analogous to that of the brain when a piece of the skull is driven in upon it and causes symptoms of compression, which are relieved by the removal of the cause of the compression. With this notion he held it feasible to remove the compressing vertebral arch, and so to relieve the palsy. In the clinical lecture which he delivered he explained the reasons which had induced him to perform this operation, and the grounds upon which he hoped for success.

He considered that in fracture with displacement of the vertebræ, which compressed the spinal cord, this great nervous cord was under precisely the same circumstances as the brain when pressed by fractured skull, and that, therefore, as the elevation of the pressing bone was indicated in the latter case, and often effected with success, so was it equally called for in the former, and that no positive reason could exist why the operation should not be successful, provided the injury of the spinal cord itself were not great, a condition which, as regarded the brain, could equally forbid operation, or render its success improbable or impossible. Before undertaking the operation of cutting out that part of the arch of the vertebra which compressed the cord, Cline proposed to himself the following four questions, to which he gave the annexed replies: (1) Will the patient die of the operation? Probably he will, if the injury be severe.† (2) If the cord be much hurt, will it recover its functions? This is unknown; but we do know that if a nerve be divided it will unite, and the greater part of the spinal cord may be divided in a brute and yet the animal recover; in proof of which he detailed an experiment which he performed on a bitch. (3) After the removal of the arch of the vertebra will the spine be sufficiently strong to support the body? Probably it will for ordinary purposes, though the patient may not be able to lift heavy weights. (4) Will a patient recover from a compound fracture of the spine, which, by the performance of the operation, it becomes? The nearer a fracture is to the source of the circulation, and the less compact, and consequently the more vascular, the bone is, the greater is the probability of recovery. Both these advantages are present in the spine, and therefore favor the successful issue of the case. He added that the only reasonable objection to the operation of trephining the spine is, that we cannot, previous to the operation, ascertain whether the spinal cord is simply compressed, or whether it is partially or entirely torn through, or whether the symptoms of compression result from the effusion of blood in different situations, neither of which indeed can be ascertained after the vertebral canal has been opened, unless the sheath be rent.

Cline's operation, although his patient died, attracted great attention, and for a time its propriety was vigorously discussed. An earnest argument, often degenerating into bitter and virulent personality, was kept up for many years, Sir Astley Cooper, Benj. Bell, Tyrrell, South, and others endorsing and upholding the operation, while Sir Charles Bell, John Bell, Sir Benj. Brodie, and others violently opposed it. The following quotations give an idea of the tone of a portion of the papers which were published about that period. Brodie wrote of the operation that "even under the most auspicious

* Here and elsewhere throughout this paper I have used freely the material contained in a former paper of my own on the same subject, adding largely to it and bringing the history down to date. (See "Annals of Surgery," June, 1888.)

† South says, "I do not exactly understand the answer given, for there is no danger in the operation, if it be performed with care; but I suspect he thought the exposure of the spinal cord might hasten inflammation, and so death might more quickly result."

circumstances it must be doubtful whether it may not be productive of harm rather than of good to the patient;" while Sir Astley Cooper concludes his remarks on the subject as follows: "Though I may not live long enough to see the operation frequently performed, I have no doubt that it will occasionally be performed with success. There is no reason why it should not; and he who says that it ought not to be attempted is a blockhead."

After a time, however, the controversy languished, although here and there a solitary operation, almost invariably entirely unsuccessful, was recorded.

Dr. Alban G. Smith reported a case in which portions of the third dorsal vertebra were removed for relief of paralysis from fracture. At the time of the report, bed-sores, from which the patient had previously suffered, had healed, and there was return of sensation (*North American Medical and Surgical Journal*, July, 1829, vol. viii. pp. 94–97).

In the *British and Foreign Medical Review* for 1838, in a critique of Sir Charles Bell's "Institutes of Surgery," the reviewer quotes a successful case, in which the operation was performed by a Welsh surgeon by the name of Edwards, resection having been made in the lumbar region. The case, however, is very imperfectly reported. The cases of Tyrrell, Barton, Wickham, Smith, Rogers, and others were all unfavorable, and Malgaigne, after having reviewed their results, joined the ranks of the opponents, deciding that the fatality of the recorded cases should be sufficient to deter surgeons from so grave an operation. He believed that if the ordinary methods were not sufficient in a case of fracture with displacement, we might try to act on the posterior fragment with forceps or tenacula to draw it backward, but that "the extraction or trephining of the arch presents itself as so desperate a resource" that he would not advise any one to adopt it.

Mayer reports a case of paraplegia following injury in which he removed a portion of the sixth and seventh dorsal vertebræ with some temporary improvement, but followed by death on the twenty-first day with all the symptoms of sepsis (*Journal der Chirurgie und Augenheilkunde*, Berlin, 1848, vol. xxxviii. pp. 162–200).

In 1861, Dr. Hutchison, of Brooklyn, published (*American Medical Times*) the history of an operation for fracture, which resulted in death, and reviewed the histories of the recorded cases up to that time. He did not arrive at any general conclusion as to the propriety of surgical interference.

Dr. A. A. Potter reports three cases of operation for paralysis following fracture. In one of them no improvement followed. In another death resulted in four days. In the third, in which there had been complete paralysis of motion and sensation, a perfect recovery was effected (*American Medical Times*, 1863, vol. vi. pp. 17, 18).

Laugier (Felizet, *Archiv. Gén. de Méd.*, October, November, and December, 1865), on the fourth day after a fracture of the spine, removed the eighth dorsal spinous process, which was broken, and trephined the arch of the ninth dorsal vertebra. The patient died on the fifth day after the operation. Fracture of the body of the eighth dorsal and comminuted fracture of the body of the ninth dorsal vertebra were found.

In 1865 considerable attention was again drawn to the operation by Dr. Robert McDonnell, who reported the case of Dr. Samuel Gordon, in which trephining of the twelfth dorsal vertebra had been followed by the healing of a bed-sore, the disappearance of a virulent cystitis, and the return of power over the bladder and of sensation in the rectum, the patient being still alive, but unable to stand, at the end of five months.

Dr. McDonnell also reported a fatal case of his own, and reviewed twenty-six cases of trephining, in seven of which life was preserved for a long time. He called attention to cases of temporary paralysis from pressure by pus, in which the cord had entirely recovered, and to similar ones of paralysis from wounds of the spine, followed by recovery on the withdrawal of the foreign body which was causing the compression.

He concluded that instances of fractures of portions of the vertebræ, unaccompanied by fracture or displacement of the body, are not very infrequent, being ten per cent. of the recorded cases which he was able to discover, the majority of them occupying the cervical or upper dorsal region.

He suggested that the loss of reflex movement in such patients might be due to a venous congestion of the cord below the seat of injury, not to structural change, and that such loss is therefore an additional indication for operation.

He thought that evidences of myelitis or meningitis, the girdle symptom, formication, cramps, spasms, fever, etc., contraindicated operation; but believed that the softening of the cord under pressure was quite different from ordinary inflammatory softening or "white softening," and that it indicated no structural change from which the cord could not recover.

In the discussion in the Royal Medical and Chirurgical Society (*Medical Times and Gazette*, December 9, 1865, vol. ii. pp. 639, 640) which followed the reading of Dr. Gordon's paper, Mr. Alexander Shaw called attention to the fact that in this successful case the operation was not performed until the second month after the accident, during which time the vertebral column must have undergone essential changes; so that, if the bones had not perfectly united, at least all the adjacent parts must have become consolidated by the processes of repair.

"And," he added, "observations show that when patients have passed through the first stages of the accident, and have lived long enough for the injured parts to acquire some solidity and firmness, their chances of surviving, although with paraplegia remaining, are greatly increased; the probable reason being that, as they can be moved more freely in bed, and their positions more frequently changed, the bed-sores are more likely to be cured."

In the same year Felizet (*op. cit.*) reviewed twenty-six cases, and reached the following conclusions: 1. The cause of death after fracture of the vertebræ is the compression or continued irritation of the spinal cord. 2. The operation should not be held responsible for the subsequent symptoms, as they are equally grave in cases where no interference has been practised. 3. Trephining, on the contrary, conforms to physiological conditions, causes almost immediate improvement if the cord were not completely destroyed, and in those cases where it fails, the failure is almost always due to the gravity of the traumatism itself.

In 1866, Mr. Jonathan Hutchinson ("Clinical Lectures and Reports of the London Hospital," vol. iii. p. 327) considered at length the conditions usually met with in spinal fractures and luxations, with the object of furnishing conclusive arguments in support of the usual practice at the London Hospital, of abstaining from operative interference in such cases.

He asserted that a great many cases recover, if put under favorable circumstances and let alone, and that of those which end in death, very rarely indeed could it be said, after post-mortem examination, that an operation could by the barest possibility have done any good. In the great majority, then, since it could have done no good, its effect would have been to increase the patient's sufferings and aggravate his danger.

With regard to the lesions usually met with in the post-mortem room, he made the following assertions, based on the examination of about twenty cases: "1. Permanent compression of the cord, or of any part of it, is a very rare event. From my experience I should not think that permanent displacement to any material degree is met with once in ten cases. 2. As might be expected from the fact that almost all the more serious injuries to the spinal column are due to indirect violence (bends), the fractures of the laminæ are of little consequence, and never cause compression of the cord. In almost all our cases the laminæ, spinous processes, etc., are more or less fractured, but I have never yet seen a case in which any of the fragments were in contact with the cord. 3. Having thus denied that the cord is permanently compressed, either by the bodies or the laminæ, I now extend my statement to extravasations of blood. I have never myself seen any effusion to the extent of possible compression, and in the majority of cases there is little or none. The injury is a crush, and is not one at all likely to cause much bleeding. There are no large arteries to be injured. 4. Instances of great displacement of one vertebra do sometimes occur. They are exceptional, however, and very rarely of a kind which we could rectify by force or by operation. 5. The cases in which during life there is evidence of considerable displacement are not by any means always the most serious ones. The irregularity, perceived externally, concerns rather the spinous and transverse processes than the bodies, and it is very possible that they may have been fractured without any crush of the cord; and, on the other hand, that the bodies may have been displaced for a moment, allowing complete crushing of the cord, and yet no permanent irregularity may have resulted. In justification of the strong opinion I have already expressed against operations with the intention to elevate depressed portions of bone, I must say a few words more. *My chief reason is that by doing so you convert a simple into a compound fracture, and add the risks of pyæmia, together with those of spinal meningitis.* Then I urge that depressions of bone very rarely exist, perhaps not one in twenty cases, and that it is utterly impossible to select the case."

Mr. Maunder reports the case of a man aged 28 who, having paraplegia as a result of an injury, was operated upon nineteen days later.

The spines of the first and second dorsal vertebræ were cut off, and the corresponding laminæ removed by the trephine and bone-forceps. The patient died of pyæmia on the thirteenth day. At the autopsy, the cord was found to be "pulped" opposite the lower border of the seventh cervical vertebra (*London Lancet*, 1867, i. pp. 237, 238).

In 1867, Dr. John Ashhurst reviewed the subject up to that date, publishing a table of twenty-six cases, many of which were included in Dr. Hutchison's and Dr. McDonnell's collections, reviewed their clinical history, said that there was not in fact one well-authenticated instance of recovery from spinal resection, and concluded that in no case did resection or trephining offer a reasonable prospect of improving the patient's condition; but that, on the contrary, there was reason to fear that they increased the chances of fatal termination.

In 1869, Mr. Thomas Nunneley, in an address on "Surgery" before the British Medical Association, again brought the subject to the attention of the profession. He said that while the great majority of surgeons had had an unfavorable opinion of the operation of resection of the spine after fracture or dislocation with symptoms of compression, and while for many years it seemed to have been almost forgotten, yet he could not but think that this position had resulted more from submission to habit or to traditional authority than from a due consideration of the subject. He reported four cases of his own with one recovery, reviewed the tables of McDonnell, and concluded that out of thirty-three cases of fractures in various parts of the spine, life had been permanently saved in three and considerably prolonged in three others, and that in still others general improvement had resulted. He called attention to the fact that all the successful cases were most unfavorable at the time of the operation, and should, therefore, not be compared with large collections of injuries to the spine, of all grades of severity. His general conclusion, therefore, was distinctly favorable to the operation, and he quoted with approval the dictum of Sir Astley Cooper, who, more than once, declared that if one patient out of one hundred could be saved it would be better than could be hoped for from nature alone. During the same year, however (1869), Mr. LeGros Clark, in a lecture on "Diseases of the Spinal Cord" (*British Medical Journal*, July 17, vol. ii. pp. 49-52), took equally strong ground against the operation. His argument may be summarized as follows:

The end proposed in an operation of this kind is to remove displaced bone which is supposed to press upon or irritate the cord. But such a proceeding is most likely to prove abortive from the inaccessibility of the displaced bone, fractures of the arches alone being vary rare except from direct violence. But the direct violence which would suffice to fracture the arch and drive the spinous process into the cord, the body of the vertebra remaining unbroken, must almost inevitably prove hopelessly destructive to the nerve-tissue. Again, if the surgeon operate early, he does so before it is known whether the injury is permanent, a fact which can only be developed by time; if he wait he diminishes his chances of success. If he does operate, he converts a simple fracture into a compound fracture, and a communication is established with a canal having the most delicate and susceptible relations, and which must be liable to the intrusion of the products of inflammation during such period as the patient may survive the effort to repair the lesion. If the cord has been crushed, and the operation has been consequently useless, probably life may be thereby only curtailed; but if (as must be presupposed for the operation to have a chance of success) the cord be not crushed, it appears that the best chance for the patient's recovery is merely extinguished. The operation has been advocated on the *erroneous hypothesis that the spinal cord can be compressed without serious disintegration of its texture. I believe this is scarcely ever the case*, unless such pressure result from extravasation of blood, a condition which, if it could be ascertained, would not be regarded as indicating operation.

The only supposable form of spinal surgery which, in

my opinion, might be benefited by operation is a fracture of the vertebral arch alone, with limited depression, or the recent intrusion of a spiculum of bone within the theca, whereby the cord is pricked and irritated. But where are these cases to be met with, and how are they to be recognized? I fear we must abandon this operation. It can scarcely be alleged by its advocates that, if unproductive of good, it is harmless. To weaken still further the remaining connections of a broken spine, to convert a simple into a compound fracture, to expose the sheath of the cord, and possibly the cord itself, and to entail the risks attending the period of repair, cannot be regarded as circumstances of indifference.

At present, with every disposition to regard this subject impartially, and to give their due weight to the arguments and facts which have been advanced in its favor, I cannot regard trephining the spine as brought within the pale of the justifiable operations in surgery.

In 1870, M. Brown-Séquard, from the point of view of a neurologist, as well as of an experimental physiologist, upheld very strongly the theory that death after fracture of the spine is usually due to the effect of continued irritation of the cord by pieces of broken bone, and not to the results of a partial or complete section of this nervous centre ("Physiology and Pathology of the Nervous Centres").

He quoted the clinical history of many cases to prove that section, or even crushing of the spinal cord, had not proved fatal, and emphasized the fact that in animals death is rarely caused by complete section of the cord in the dorsal region, while they die as quickly and as often as men after fracture of the spine if the broken pieces are not removed. He further called attention to the removal of the body of the third cervical vertebra by an Italian surgeon in a case of syphilitic caries, to another analogous case also operated upon by an Italian surgeon, and to two cases of cyst in the spinal canal with erosion and expulsion of portions of the vertebræ, all of which recovered.

He believed that, as the result of his investigations, the following conclusions were justifiable: 1, that the laying bare of the spinal cord was not a dangerous operation; 2, that death after a fracture of the spine is usually due to the effects of pressure, or of excitation of the spinal cord, and is not the result of a partial or a complete section of this organ; 3, that reunion may take place after a wound of the spinal cord, so that its lost function may return; 4, that the removal of some parts of the vertebræ may be followed by a production of new bone; 5, that the cases of fracture of the spine in which the trephine has been applied show the usefulness of this operation.

In spite of this pronunciamiento, another long interval ensued, with very few reported cases which I have been able to discover of resection of the spine in case of injury. Two cases in 1870, operated on by Cheever, of Boston, both resulted fatally, as did one operated on by E. R. Willard in 1871, and one by Lucke in 1880. Stemen, of Indiana, in 1883, reported three cases,—one relieved, one not benefited, one fatal in eight days.

In 1884, Dr. John A. Lidell, in the article on "Injuries of the Back," in volume iv. of the "International Encyclopædia of Surgery," quoted Ashhurst's statistics, recorded the statement of Professor Eve, of Nashville, to the effect that the operation of resection of the dorsal vertebræ is "one of the most difficult in surgery, if not impracticable," and concluded that the operation of resection or trephining the vertebræ is unjustifiable, because it does not offer a reasonable prospect of improving the patient's condition in any case, while, on the other hand, there is always reason to fear that it may increase the chances of a fatal termination.

In September, 1884, Dr. Halstead, of New York, operated at the Roosevelt Hospital on a patient who, three days previously, had suffered a fracture of the spine of the twelfth dorsal vertebra, with rotation and forward luxation of the body of the same vertebra and fracture of the right transverse process of the first lumbar. The displacement was reduced with the help of Langenbeck's hook, but the patient died seventeen hours later (*Medical News*, January 3, 1885).

In November, 1884, Dr. Pinkerton, acting as house-surgeon for Dr. E. L. Keyes, removed the spinous process and lamina of the twelfth dorsal vertebra, which had been fractured four days previously. The patient died five days later (*ibid.*).

In February, 1885, Mr. William Macewen (*British Medical Journal*, August 11, 1888) operated in the case of a man who, six or eight weeks previously, had had a severe injury to the spine at the level of the lower dorsal vertebræ. He had absolute motor paralysis, incontinence, hyperæsthesia followed by anæsthesia, rapid muscular atrophy, cystitis, bed-sores, pyrexia, etc. Resection was performed. The arch of the twelfth dorsal was found fractured and depressed. A connective-tissue tumor between it and the theca was removed, as well as the laminæ involved. The patient made a good recovery, and a year later could walk about with ease and without support.

In 1886, Dr. Robert T. Morris reported ("Annals of Surgery," June, 1886) the case of a patient who, as the result of a fall upon the head, had complete paraplegia, with loss of sensation and of motion at nearly all points below the neck. Two years and three months after the accident the laminæ and spinous processes of the seventh cervical vertebra and the spinous process of the sixth cervical vertebra were removed. The patient lived ten months, but was not materially improved. At the autopsy very extensive disease of the cord itself in the neighborhood of the injury was found. The membranes were thick and firmly adherent to each other and to the vertebræ.

In 1886, Dr. Carl Lauenstein, of Hamburg, reported (*Centralblatt f. Chirurgie*, No. 51, 1886; *London Med. Record*, March 15, 1887) the case of a patient who, five weeks before coming under observation, had had a fall of forty feet. This was followed by paraplegia, incontinence of urine and fæces, trophic changes, etc. There was a projection in the dorso-lumbar region, most prominent over the spine of the last dorsal. The use of a plaster jacket had failed to give relief. The arches of the last dorsal and first lumbar vertebræ were removed by means of a chisel.

Six months later the patient was able to walk, the incontinence had disappeared, and he was reported as quite recovered.

With the view of deciding the question whether such improvement as had resulted in this case could possibly be attained without the performance of a surgical operation, Lauenstein reviewed the published reports of similar cases, and studied especially the statements referring to paralysis of the bladder. The relief of this condition, he states, is a point of much importance, for, with the exception of bed-sores, which usually occur in such cases, cystitis is, undoubtedly, the most formidable of all the secondary symptoms. Of fifty-three cases of so-called cure of fracture of the spine, collected by Gurlt in his work on fractures, there are fifteen instances of spontaneous restoration of the functions of the bladder and rectum. The shortest interval between the date of the accident and that of complete restoration of the functions of these organs was a few hours, and the longest interval eight weeks.

In not one of six cases of fracture of the spine with paralysis of the bladder, treated by Lauenstein during the last six years, was any spontaneous improvement observed in this latter condition after long intervals. It is concluded from these returns that when, in cases of compression of the cord from fracture of the spine, the functions of the bladder and rectum are restored, this restoration usually takes place after a brief interval, and that if no improvement has taken place in the course of ten weeks, any subsequent spontaneous change for the better in the condition of the bladder can hardly be anticipated. In the case reported by Dr. Lauenstein the bladder symptoms just before the operation were increasing in severity.

Since the introduction of the antiseptic method into practical surgery two other instances in addition to Macewen's and Morris's cases had been reported up to this date (1887) of operative interference for the relief of paralysis from injury to the spine.

The first of these, reported by Maydl, from the hospital practice of Albert, was a case of resection of the ninth and tenth dorsal vertebræ for paralysis following fracture. The dura was opened, but nothing abnormal was seen. The cord was, however, compressed from the upper border of the tenth to that of the ninth vertebra, partly through the fracture of the body and partly through a bilateral luxation between these two vertebræ. The patient recovered from the operation, but was not improved (*Wiener Med. Presse*, 1884, vol. xxv. pp. 1336–1340).

In the second case, reported by Lucke, the operation was performed two days after an injury to the spine, which was found to consist in fracture with crushing of the corresponding part of the cord. This patient also recovered from the operation, but died nine months later from marasmus, and without any but very slight improvement having been observed in the condition of the paralyzed limbs. In six only of thirty-one cases collected by Werner of operations performed on fractured spine in the pre-antiseptic era did the patients recover from the effects of the operation. These results, however, Lauenstein held, cannot be brought forward to discredit the operation of trephining the spine, since sufficient care was not taken in their selection; and the treatment was applied in instances both of recent and of old injury, and even of complete crushing of the cord.

Lauenstein would not operate in a case of recent injury to the spine, as it is well known that occasionally in such instances the symptoms of paralysis disappear spontaneously in the course of a few weeks.

Severeneau reports a case of shot-wound of the back with fracture of the second dorsal vertebra, paralysis of all four extremities and of the bladder and rectum. The ball was recognized with the help of an electrical apparatus and was extracted. Paralysis disappeared, and the patient entirely recovered (*Archiv für Klin. Chirurgie*, 1888, vol. xxxvii. pp. 664, 665).

In the *Edinburgh Medical Journal* for March, 1889, Mr. John Duncan reports three cases of fracture of the spine with paralysis which were operated upon by removal of the laminæ of the broken vertebræ. One case died on the following day; the others recovered from the operation, but were unimproved.

Horsley, in a foot-note to his paper on the case of spinal tumor, says he has operated on a case of fracture, and that the wound healed rapidly, but gives no other details. In the paper itself he also mentions a most interesting case of operation for paralysis following fracture, in which the wound healed rapidly, as did a large bed-sore. There was but little general improvement.

It was found in this case that the spinous process of the eleventh dorsal vertebra was jammed forward between the tenth and twelfth, and also that there was backward compression of the cord against the lamina of the tenth vertebra. These were removed. Mr. Horsley makes the following remarks apropos of these cases, and with reference to the dictum that when there is evidence that the cord has been severely jammed or compressed at the time of accident, an operation is contraindicated:

"In this case no doubt the spinal cord was momentarily jammed at the time of the accident so severely as to practically—*i.e.*, functionally—divide it. Though laminæ were found compressing it at the time of the operation, nevertheless they did not do it so severely as to thereby alone cause the excessive degree of the symptoms, therefore it would seem that the cord, as suggested, must have been compressed at the time of the accident. Now, this is just a case in which, if any attention had been paid to the ruling before quoted, the patient's life would have been lost, and indeed it must be obvious that, considering the necessarily small amount of information on this subject, it should be our duty to operate in every case, since we may possibly do some good, and certainly, if proper antiseptic precautions be taken, we can, to use Mr. Erichsen's words, do no harm.

This question of the damage to the spinal cord not appearing to discount the possible benefit of surgical interference so much as has been hitherto expected, gains additional illustration from the case which forms the subject of this paper, since nothing could well have appeared more hopeless than the indentation of the spinal cord produced by the tumor. This indentation appeared to divide the lateral column completely, and yet, owing doubtless to the gradual character of the compression, the restoration of motor and sensory function has been complete. I would repeat, therefore, that, so far from its being unjustifiable to operate on the spine owing to the possibility of the cord being hopelessly damaged, it seems to me to be criminal not to operate."

Mr. Ernest Hart reports (*British Medical Journal*, March 23, 1889) a case of Péan's in which paraplegia, retention of urine, etc., followed a severe contused wound of the mid-dorsal region caused by the bite of a horse. The spinous processes of the seventh and eighth dorsal vertebræ were not to be felt. Péan removed by operation the fragments of these processes, and of the corresponding laminæ which had pierced the membrane and entered the substance of the cord itself.

He resected the irregular ragged fragments of the transverse processes. Mr. Hart reports that the operation was completed without complication, and that "the patient is now restored to almost his ordinary condition."

Mr. Herbert Allingham reports (*British Medical Journal*, April 13, 1889, p. 838) two cases of fracture of the spine treated by trephining. In one there was fracture with depression of the laminæ of the sixth dorsal vertebra; the spines and laminæ of the fifth, sixth, and seventh were removed. The wound healed in ten days. The symptoms of ascending changes were checked. Improvement to some extent occurred.

In the second case the spines and laminæ of the third, fourth, fifth, and sixth dorsal vertebræ were removed; the wound healed in a fortnight. No mention of the subsequent course of the case is made except the fact that the woman died seven weeks later, and that the cord was found almost divided.

Dr. Robert Dawbarn has reported (*New York Medical Journal*, 1889, vol. xlix. p. 711) a case of paralysis following fracture at the dorso-lumbar junction in which he operated, finding depression of the lamina of the eleventh dorsal vertebra and a fracture of the body of the twelfth dorsal vertebra, which had in part been thrown backward. The depressed lamina was firmly adherent to the theca, and on removing it it was necessary to saw and to elevate the posterior arch of the tenth dorsal vertebra. The cord was found in the shape of a distinct knuckle making an angle of fifteen degrees, its apex pointing backward and lying immediately below the depressed arch. The tenth, eleventh, and twelfth arches and laminæ were removed. The dura was not opened. Ten weeks after the operation all motion and reflexes were still absent. The muscular sense was improved. The power of the bladder was markedly increased. The rectal sphincter was regaining strength. Pain upon motion had largely disappeared. The temperature of the legs had much improved.*

Dr. J. E. Richardson reports (*Brooklyn Medical Journal*, 1889, vol. iii. pp. 401–416) the case of a man, aged 22 years, who had a swelling upon the back of the neck, extending from the third to the seventh cervical vertebra. There was stiffness of the neck, with limited movement of the head and pain on pressure over the cervical spine. After this had lasted for about ten months he began to complain of numbness of the hands, and paresis of the sphincters of the bladder and rectum and of the lower extremity, which finally increased to almost absolute paralysis of both upper and lower limbs. As soon as the patient was anæsthetized, the tumor over the neck instantly disappeared, and it could then be seen that it was caused by the contraction of the muscles of the neck in their endeavor to hold the head and neck erect.

An incision was made extending from the occipital protuberance to near the spine of the seventh cervical vertebra, and, dissecting down to the spinous processes, the lamina of the fifth cervical vertebra was removed with the trephine. The cord was then distinctly seen. It was supposed that there might be an accumulation of pus within the spinal canal, the evacuation of which would remove the pressure. It was found, however, that none existed, and it was decided to do nothing further. The operation was performed antiseptically, and the wound washed out with a solution of bichloride, 1 to 2000; a drainage-tube was inserted into the wound, and the latter then closed and dressed. There was decided improvement in sensation immediately after the operation, but death occurred four days later.

Passed Assistant Surgeon S. T. Armstrong reports ("Reports of the U. S. Marine Hospital Service," 1889, pp. 271, 272) a case of fracture following extreme flexion in which there were complete paralysis, bed-sores, hectic, etc. On October 8 the patient was chloroformed, and resection of the vertebræ was made. An incision was made over the spines of the last dorsal and first lumbar vertebræ, the muscular mass dissected away, and the spines of the twelfth dorsal and first lumbar vertebræ removed, exposing the canal. The membranes of the cord appeared normal, the cord itself being atrophied, and there was no septic fluid in the canal. The anæsthetic was discontinued during the operation, and, as there was anæsthesia of the tissues, the operation was completed with chloroform. There was a "perceptible angling" of the vertebral column, but no pressure was exerted on the cord. The wound was accordingly dressed antiseptically, further operative interference not being indicated.

No improvement in sensation or motion followed the operation. The hectic fever caused by the large granulating and suppurating sores produced by the vasomotor paralysis continued. The patient died October 15. The autopsy showed septic abscesses in various places, and the following condition of the spine itself. On removing the vertebral column a fracture of the body of the third dorsal vertebra was found, almost the entire right half of the body being absorbed. There was also a fracture of the anterior superior edge of the body of the twelfth dorsal vertebra. No fracture of other bones.

In this case the operation was of no benefit, for the pressure on the cord in the region of the twelfth dorsal vertebra was demonstrated as of small consequence. The fracture of the third dorsal was unrecognized during life. At the necropsy no pressure of the cord was found at this site. The large ulcerating surfaces offered an excellent opportunity for septic infection, and it was impossible to heal them on account of the trophic disturbance.

Dr. James Bell reports (*Montreal Med. Journal*, 1889, vol. xix. pp. 911–913) the case of a man, aged 40, who, as the result of a fall, had complete paralysis below the arms and partial paralysis of these extremities. Resection of the laminæ of the fifth and sixth cervical vertebræ was practised, and the dura mater was picked up and incised: a considerable quantity of a reddish cerebro-spinal fluid escaped; the cord looked normal on its surface;

* Dr. Dawbarn thinks that we may now advance the following statements as a rule of practice: "Whenever, following traumatism, even a slight abrupt irregularity of the spinal column is observed to coexist with paraplegia from this level, a cutting operation is indicated to determine whether the paralysis is not, by bony pressure, made incapable of spontaneous relief.

"This operation should be deferred no longer than recovery from the original shock of the injury demands. If needed at all, it is needed early; and we make a mistake if, as in my case, we wait until electricity and time have alike proved futile before attempting what I may call exploratory resection. It will be the easier by far to the surgeon at this early stage, and the safer for the patient; at least when the obvious displacement is due to a broken posterior arch, as then comparatively little bony section would be needed, the fragments not having become consolidated by bony union in their false position."

no evidence of traumatism was to be seen. The patient made a good recovery from the operation, but died suddenly three days later. Post-mortem examination showed a portion of the cord, about three-quarters of an inch long, opposite the sixth cervical vertebra, soft to the touch. No dislocation of the bodies of the vertebræ, and no separation of the posterior ligament.

In another case Dr. Bell resected the lower cervical vertebræ in a case of paraplegia after accident, and found one inch of the cord substance very badly crushed. The operation was therefore terminated. The patient recovered from it, but died comatose three days later from respiratory failure.

Dr. N. P. Dandridge has reported (*Journal of the American Medical Association*, 1889, vol. xiii. pp. 37–43) five cases of fracture of the dorsal spine. In three the plaster jacket was applied, with satisfactory results in two. In one great improvement followed rest in an ordinary bed, increasing markedly several months later by systematic suspension. In one case the tenth, eleventh, and twelfth dorsal and first lumbar arches were removed. The dura was not opened.

At the upper portion of the wound the cord seemed to be diminished in consistency. The wound healed after slight suppuration, although some improvement followed. Dr. Dandridge thinks that it was due to the assiduous care and attention the patient received, and not to the operation. "In this connection it is a matter of interest and importance to determine after what length of time we must give up all hope of the disappearance of paraplegia in Pott's disease. I desire to place on record a case bearing on this point, in which after complete paralysis for more than three years and a half voluntary power returned, and six months later the child was able to walk with a slight support. The child, now 7 years old, has been under continuous observation for years at the Children's Hospital, Cincinnati, with marked curvature in the upper dorsal region. On admission there was complete loss of power in both lower extremities, but neither incontinence nor bed-sores. This condition continued without improvement until six months ago, when motion began to appear, at first in the thigh-muscles, and now he is able to stand, and with slight aid to walk. The improvement has been continuous, and complete restoration seems probable. For nearly two years the treatment has been little more than proper nourishment and good hygienic surroundings. The case has made a deep impression on my mind, as showing the power of recuperation possessed by the cord."*

Dr. Dunnavant reports (*Memphis Journal of the Medical Sciences*, 1889–90, vol. i. pp. 142–144) the case of a gunshot wound of the spinal cord in which the laminæ of the second and third dorsal vertebræ were shattered, and the cord itself completely severed. Operation was performed, and several spicula of bone removed. The patient died four days later.

Dr. Thomas H. Manley reports (*New York Medical Record*, 1890, vol. xviii. p. 202) the case of a fracture of the sixth cervical vertebra which was found on operation to involve the laminæ. The patient died at the end of the fourth day from consecutive hemorrhage. The cord at the autopsy showed no signs of traumatic or pathological disintegration.

Delorme reports (*Gazette des Hôpitaux*, 1890, vol. lxiii. p. 249) a case of wound of the base of the neck by a musket-ball. This was followed by suppuration, which lasted for seventeen years. Radiating pains were felt in the left upper extremity, and were localized in the left half of the neck. There was condensing ostitis of the lower portion of the vertebral column on the left side. Resection of the posterior extremities of the first four ribs on the left side was performed, and at the same time the spinous processes of the first dorsal and seventh cervical vertebræ and a portion of the laminæ and of the transverse processes of the latter vertebra were removed. A mass of callus was found in this region, and was removed at the same time. The patient was entirely relieved of the pains, which had previously been almost unendurable, and made a complete recovery.

Dr. L. S. Pilcher has reported ("Annals of Surgery," 1890, vol. xi. p. 194) a case of fractured of the spine at the junction of the dorsal and lumbar regions, followed by rapidly-ascending paraplegia, and by rigors and fever. On the eighth day the spines and laminæ of the last three dorsal and first lumbar vertebræ were removed, exposing a partly-organized blood-clot about a line in

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* After a review of his own and other cases of fracture, Dr. Dandridge formulates the following provisional conclusions: "1. In fractures of the cervical vertebræ there is indicated immediate reduction of any displacement by extension and manipulation under an anæsthetic, followed by continuous extension and immobilization.* 2. In all fractures of the dorsal or lumbar spine involving the bodies or the arches, with or without evidence of injury to the cord, the immediate application of the plaster jacket by the hammock suspension preceded, if there is evident displacement by an extension, under an anæsthetic. 3. When symptoms indicating injury to the cord persist without improvement resection is indicated. 4. Immediate operation would be indicated where there is marked depression of the arches with symptoms of paralysis. 5. Long continuance of the symptoms is not in itself a contraindication to operation. 6. We have in suspension the means of alleviating some of the sequelæ of fracture of the spine."

* Dr. Herbert Burrell, in a valuable paper read before the Massachusetts Medical Society, June, 1887, has recorded the results of immediate rectification of the deformity and fixation of the spine by means of a plaster jacket. He details sixteen cases, in which three died, three derived no benefit from the method, and ten were greatly benefited. He arrives at the following conclusions:

1. That in the immediate correction of the deformity and fixation with the plaster-of-Paris jacket or other means we have a rational method of treating a large number of cases of fracture of the spine.

2. That, considering the hopelessness of results in fracture of the spine when treated expectantly, almost any risk is justifiable.

3. That the immediate correction of the deformity is imperative, as softening of the cord can and does occur from pressure at the end of forty-eight hours.

4. That the suspension of the patient is only a means of rectifying the deformity; that certain fractures could be simply pressed into position while the patient lies prone or supine.

The objections to the treatment are: 1. That the expectant plan of treatment gives a small percentage of recoveries. 2. That there are, especially in the cervical region, serious risks attending the suspension of a patient with a fractured spine and the rectification of the deformity,—in the way of shock, collapse, and death. 3. That in atempting to relieve pressure on the cord by rectifying the deformity, we might either sever the spinal cord or make pressure upon it. This is a matter of chance.

My own belief regarding the status which the procedure should occupy in surgery is, that it will occasionally be a life-saving measure; that it should be applied under anæsthesia in all cases of fracture of the spine which are not conclusively shown to be irremediable; and that, apart from the chance of recovery offered to the patient by this means, it will almost invariably make the patient more comfortable, in that he can be handled more easily.

thickness, lying external to the dura mater. The line of the fracture was through the dorso-lumbar articulation, with fracture of the spine and the laminæ of the last dorsal vertebra, but without depression or displacement. The patient died of asthenia thirty-six hours after the operation.*

Dr. Robert Abbé reports (*New York Medical Record*, 1890, vol. xxxiii. p. 85) three cases in which he operated for paraplegia from fracture. In one there was paraplegia below the eleventh dorsal of two and a half years' duration; the patient died thirty hours after operation. In another there was a fracture of the eleventh dorsal vertebra with paraplegia. At the operation the dura was opened. The patient recovered, but remained unimproved. In the third, three arches, the tenth, eleventh, and twelfth, were cut through and the spinal cord laid bare for two and one-half inches. The twelfth dorsal vertebra was found to have been displaced backward, the fracture running through the articular facets, the pedicles and laminæ. The cord was compressed between the arch of the eleventh above and the upper lip of the body of the twelfth below. The intervertebral cartilage had been ruptured. Above the line of pressure the cord pulsated, below it did not.

In half a minute after the cord was released from its flattened state (the bone-pressure area being only half an inch deep) the dura became rounded up as full as it was above or below. When it was filled out there was no surface appearance by which one might say that the cord within was not normal, except that the upper portion pulsated. Dr. Abbé emphasized this point because surgeons so often have reported that the cord appeared normal, and therefore they did not open the dura. The wound now being irrigated and dried, the dura was slit up for two inches. Adhesions of various densities were found within, attaching the meninges to the dura, and they formed a complete circular dam, shutting off the upper from the lower part of the canal. Only an ounce of clear spinal fluid came out, as the spinal canal had purposely been inclined on the table so as to prevent this. The veins of the cord were not distended. The adhesions were, with very little force, broken up. The cord was normal in thickness above the involved part, then, by a sloping rather than an abrupt change, it merged into a flattened cord for three-fourths of an inch, retaining its breadth but less than half its thickness, the principal atrophy seeming to be in the posterior columns. Throughout this flattened portion the white fasciculi of the cord could be traced continuously, so that there was no abrupt break in its continuity. The patient recovered from the operation, but remained unimproved.

Jaboulay reports the histories of two patients suffering with indirect fracture of the spinal column on whom he operated. In one there was a fracture of the sixth dorsal vertebra. The symptoms were extremely urgent and becoming more so. At the end of two days the arches of the fifth, sixth, and seventh dorsal vertebræ were raised, and the dura mater incised; a quantity of blood escaped from the sub-arachnoid space. The patient lived eighteen hours. The second patient, a woman 38 years of age, had a fracture in the dorso-lumbar region. She was paraplegic, had bed-sores, and had a fracture of both bones of one leg, which at the end of four months did not show the least trace of consolidation. The operation consisted in the removal of the arches of the twelfth dorsal and first and second lumbar vertebræ, together with a fragment which completely obstructed the lumen of the spinal canal. One month afterwards the œdema of the legs had disappeared and the fracture of the leg had healed, no apparatus having been applied. The patient died five months later. In both these cases the marrow was much softened at the level of the fracture (*Lyon Médical*, 1890, vol. lxiv. pp. 265–269).

Thorburn has reported ("A Contribution to the Surgery of the Spinal Cord," 1890) five cases of trephining for injury.

CASE I.—The patient, a man, aged 38 years, had a dislocation of the fifth cervical vertebra, with paraplegia, complete paralysis of the right upper limb, absence of reflexes, etc. The operation was performed about twenty-four hours after the injury. The laminæ of the fifth and sixth cervical vertebræ were removed by bone forceps. The dura mater appeared normal and was not opened. The patient died the following day. At the autopsy, the fifth cervical vertebra was found projecting slightly forward. No fracture was discovered. The dura was uninjured, but the cord was flattened opposite the seat of injury, and was much contused for about an inch above and below, containing hemorrhages in its

* Dr. Pilcher, after reviewing the objections to the operation, adds: "I am, however, far from accepting the sweeping condemnation with which Jonathan Hutchinson and Le Gros Clark have declared all such operations unjustifiable. The reasons which prompted me to operate in the one case in which I did interfere I believe to have been valid and sufficient, notwithstanding the fact that no special benefit accrued to the patient from the attempt. Fractures of the spine in which the lesion is caused by a force which acts only upon a very limited segment of the column evidently form a class much more likely to present conditions amenable to operative interference than cases in which the injuring force is more diffused. The injury to the cord will be much more limited in extent; the presence of depressed fragments pressing into or upon a wounded cord is more likely to exist; no extensive resection of the posterior arch of the canal will be required. And those cases in which the bone injury is limited to the spinous processes and laminæ form a class which should be distinguished clearly, as regards the possibilities of advantage by operative interference, from the cases in which there is complete fracture through the bodies of the vertebræ. As is well understood, in many cases of complete fracture—illustrated in the two cases above detailed—the soft structures which bind the bones together posteriorly are not ruptured, and continue to form a most important bond to prevent displacements in the subsequent history of the case. To divide these, as is necessary if the spinal canal is to be opened, entails the destruction of this means of support which cannot be adequately substituted, and is a sacrifice which ought to be made with great caution and only on the clearest evidence of the existence of a more imperative indication. If, however, the bodies are intact, or if the case has progressed to a period in which consolidation of any fracture involving them has occurred, then the posterior arch may be attacked without seriously increasing the hazards of the case. Gunshot fractures of the vertebræ form yet another class, one in which there is the special indication arising from a compound fracture, probably septically infected, for immediate enlargement of external wound, removal of fragments of bone, disinfection, and drainage" ("Annals of Surgery," 1890, vol. xi. pp. 196, 197).

substance and in the central canal; elsewhere its structure was normal. The first and second bones of the sternum were also partially separated, and the lungs much congested.

CASE II.—A man, aged 33 years, had a fracture of the body of the fifth cervical vertebra which projected backward, distinctly compressing the cord. He was operated upon five days after the injury. A fracture of the fifth cervical spinous process was found so loose that it could be wrenched away in one piece with the left lamina. When this fragment of bone had been taken away the dura was partly exposed, and the right lamina of the sixth cervical arch was also found to be fractured. The left lamina of the sixth arch was then divided and the whole posterior portion of the arch removed. The exposed dura was normal, and was obviously free from compression. During the operation respiration ceased, and the patient's condition became very critical, requiring him to be turned on his back for a time, with the use of artificial respiration and inhalation of nitrite of amyl. The result showed that the spinal cord was here exposed to continued pressure from the displaced bones, and that this pressure must have been relieved by the removal of the counter-pressure due to the excised arches. In spite of this, not the slightest improvement resulted in the symptoms, and it seems not improbable that the operation may have shortened life somewhat, owing to further damage having been inflicted upon the compressed cord by the necessary manipulations, especially during the period of suspended respiration. The patient survived the operation forty-eight hours.

CASE III.—A man, aged 39 years, after a severe injury, had marked immediate paralysis of sensation and motion in the trunk and limbs, with increased reflexes and anæsthesia extending far up the trunk. He improved for five weeks, after which the case became stationary, except that his general health was affected by a grave cystitis. Fifty-six days after the accident he was, therefore, operated upon. The arches of the fifth and sixth cervical vertebræ were removed. The posterior aspect of the dura was smooth and normal, but the membranes projected somewhat backward, as if distended. The patient died with high temperature and coma eight days later. At the autopsy it was found that the cartilages between the second and third and the third and fourth cervical vertebræ were broken, and there had evidently been severe over-flexion in this region, causing some compression of the upper anterior edge of the body of the third cervical vertebra, but no fracture. The bones had then returned to their positions, leaving the spinal canal free from any permanent compression. The spinal membranes were much congested through their whole extent. The cord itself was soft and diffluent opposite the fourth, fifth, and sixth cervical vertebræ. From these appearances it will be obvious that there had been over-flexion of the cervical region of the spine, and that although the greatest damage to the vertebral column was situated opposite the third cervical vertebra, the cord had suffered mainly from hæmatomyelia opposite the fifth.

CASE IV.—A boy, 15 years of age, with displacement forward of the second lumbar vertebra and compression of the cauda equina. There were paresis of the lower limbs, diminution of sensation, coldness of feet, etc. About four months after the accident he was operated upon. It was found that the arch of the second lumbar vertebra was displaced forward. This was almost completely removed by bone-forceps, exposing the membranes of the cord, which had obviously been compressed by it. Mr. Thorburn remarks that this case differed materially from the last three, both in the nature of the injury and in the result. The injury did not affect the spinal cord at all, but was confined to the cauda equina, and an interval of four months and a half had elapsed between its receipt and the date of the operation. During the earlier part of this period the symptoms had improved, but, as in the last case, this improvement had ceased, and for some eight weeks there had been no change in the patient's condition. The operation revealed a large amount of cicatricial tissue compressing the nerves of the cauda equina, and on the removal of this tissue improvement recommenced, and was eventually very satisfactory.

CASE V.—A man, aged 28 years, had a dislocation of the last dorsal vertebra, with paraplegia and partial anæsthesia. After slight temporary improvement, the case became stationary. Operation was performed eighteen weeks after the accident. The arch of the first lumbar vertebra was removed, so as to lay bare the dura. The latter appeared to be healthy, although protruding somewhat backward, but between the arches of the first lumbar and the last dorsal vertebra it was compressed by a mass of soft cicatricial tissue. As much as possible of this tissue was removed, together with the whole of the arch of the last dorsal vertebra, and the theca was then found to be so much flattened that its contents appeared to have been quite cut across. Immediately above this region the dura mater bulged slightly, and, a small spicule of bone having penetrated it, some cerebro-spinal fluid escaped. All pressure on the theca being now removed, the skin-flap was replaced and sutured. As in the last case, cicatricial tissue was found surrounding the nervous structures, and this tissue was removed, besides which the cord itself appeared to be almost entirely torn across. The subsequent improvement was practically *nil*, except for a slight recovery of function in the upper lumbar roots, which, having left the cord above the seat of the lesion, form the commencement of the cauda equina.

Mr. Golding-Bird reports (*British Medical Journal*, May 23, 1891) a case of paraplegia from fracture in which he removed the depressed laminæ of the eleventh and twelfth dorsal vertebræ and a large extra-medullary clot. He operated on the third day after the injury. The patient made a complete recovery, sitting up in bed on the eighteenth day. Mr. Golding-Bird makes the following interesting remarks in reference to the case:

"As in compound fractures of the cranial vault there is a marked difference in respect to treatment between one produced by a heavy blow and another by a sharp-pointed instrument, so in fractures of the spine the line of treatment to be adopted must be determined largely by the manner in which the fracture has been produced. When it can be ascertained that it is due to direct violence, as in this case, it has always seemed to me (and this case bears this view out) that we ought to cut down and explore for bone (lamina) driven on to the cord, just as in a puncture through the skull we always trephine for fragments of the inner table, which are often extensive when the outer wound is quite insignificant. But such cases of direct fracture are not so common as those where, falling from a height, the patient alights on the lower part of the body, breaking the spine higher up, and in such a way that the total upper part overshoots the lower, cutting the cord in two as though by a pair of scissors. In such cases operation can hardly

be expected to be of service. But often the history given of the accident is so obscure, and the result of an examination so uncertain, that it becomes a matter of pure speculation whether the paralytic symptoms are due to pressure by a broken arch or by blood-clot, or to division of the cord by a fracture of the vertebral bodies. Cases of spinal fracture are in their results some of the most sad and disappointing that can be met with in practice, for, even when life is saved, the after-condition of the patient is, to say the least of it, almost always most unsatisfactory. Seeing, then, the doubt that usually surrounds the precise nature of the fracture, and knowing what an unfavorable future lies before the patient, a surgeon is surely justified in every case in urging upon the patient the propriety of an exploratory operation, in the hope that the condition found on exposure of the bone may be a relievable one.

"Laminectomy is a recognized operation, and a perfectly safe one, whilst for its performance no special instruments are required, though special forceps for cutting the laminæ are preferred by some surgeons. This case shows that even two consecutive neural arches may be completely removed without the slightest detriment to the stability of the spinal column. That the patient's paralytic symptoms were not due to 'shock,' but to actual pressure on the cord (and therefore likely to have been lasting had no operation been performed), is shown by the fact that the left side was the worse, and it was two pieces of the left lamina of the twelfth vertebra that overlay each other and compressed the cord. A further argument for laminectomy in spinal fracture is a physiological one, and it indicates the time when the operation should be performed. In limited depressed simple fracture of the skull, though symptoms of compression are present, complete recovery may be seen though the bone is not elevated; but that is no argument for leaving a depressed lamina alone. In the case of the brain, the pressure is exerted over gray ganglionic matter, of which limited parts may be destroyed without permanent loss of function in the periphery over which that ganglionic mass presides; but the spinal cord is mainly a mass of conducting fibres, the destruction of even a minute area of which represents a large area of brain matter 'thrown out of circuit' and rendered permanently useless; hence a degree of displacement of a neural arch appreciable to the examining hand of the surgeon is no criterion of the degree or extent of harmful pressure upon the cord. Inasmuch as nerve-fibres, when divided, begin within three days to degenerate, laminectomy for spinal fracture should be undertaken within that period; for though paralysis from pressure of the cord may exist for much longer and yet be recovered from, thus showing the pressure to have been not too destructive of the fibres of the cord, yet if we wait long enough to judge of the severity of the lesion by the disappearance or not of the paralytic symptoms, we shall certainly have waited too long for operation to offer a chance of success if the latter of these results unfortunately supervenes."*

Dr. D. N. Knox reports (*Glasgow Medical Journal*, June, 1891) a case in which he trephined for fracture-dislocation of the eleventh dorsal vertebra, which was displaced backward fully three-fourths of an inch, and rotated as much to the right side. The operation was performed thirty-six hours after the injury. The patient was a boy of 13. The laminæ of the tenth and eleventh were removed. The dislocated vertebra was replaced. Sensation and motion were both completely lost before the operation, but the former returned the following day, and on the third day he regained slight motion of the toes. The progress of the patient was steadily but slowly towards entire recovery.

In eighty cases we find that there were thirty-three recoveries from the operation itself, and forty-seven deaths,—a mortality of about fifty-eight per cent. The older statistics were still more unfavorable, because, first, the cases selected were of the most extreme gravity, and, secondly, trephining opened the way for bony or meningeal infection. The want of success, even since the opening of the antiseptic era, has been due to somewhat the same causes. Pinkerton's case died of operative infection, with a temperature of an acute meningomyelitis. Keetley's had a cervical lesion, and died with pulmonary complications, after having improved for some days. Duncan's case was found at the autopsy to have a diaphragmatic hernia of the stomach and omentum, the result of the severity of the accident. Allingham's case died at the end of seven months, and the cord was found to be completely divided. One of the three patients unsuccessfully operated on by Thorburn had a cervical fracture, with anæsthesia, paralysis of all four limbs, retention of urine and fæces, and very extensive ulceration. He died in forty-eight hours. The second had a fracture in the same region, and of even graver character, and died in twelve hours. The third had also a cervical lesion, and died in eight days, with a high temperature and a suppurating wound. The two patients of Jaboulay were desperate cases at the time of operation.

In those who survived, a varying degree of success was obtained. Werner, writing of seven cases of recoveries of which he knew, and eliminating the case of Blair, which is very insufficiently described, adds: "Trephining in none of the six remaining cases restored the use of the lower limbs to the patients. In the most favorable, feeble motion in the arms and thighs returned, and the sitting position became possible. In all of them sensation returned more quickly and completely than motion. In nearly all of them the vesical functions, and in one case the rectal, were restored."

One patient, that of Edwards, had two children after the trephining. Very recent operations have been somewhat more successful. In the case of Horsley, sensation improved alone.

* In concluding this review of the history of operations for spinal traumatisms, I may summarize a portion of another exhaustive article by M. Chipault (*Gazette des Hôpitaux*, 1890, vol. lxiii. pp. 809, 969, 983).

In that of Allingham, paralysis descended to the level of the umbilicus. In that of Dawbarn there was slight improvement in motion and in the rectal and vesical functions. Dandridge and Deces had similar results. Thorburn had one incomplete success, and one so satisfactory that at the end of a year and a half his patient earned his living as a miner and was able to walk many miles daily. Macewen's patient walked without a cane a year after the operation. Lauenstein's patient at the end of six months could walk all day without a cane, and go up and down stairs easily. Golding-Bird's patient was able to sit up in bed, and apparently was quite well again in eighteen days. Knox's patient regained sensation in twenty-four hours, and a little motion in three days, and was apparently on the road to entire recovery.

The indications and contraindications for trephining in special fractures are, according to Chipault, based on the following points: 1, *the nature of the vertebral lesion and the nature and extent of the medullary lesion*; 2, *the time which has elapsed since the traumatism*; 3, *the regional level of the medullary lesion.* In studying these points only those cases should be included in which the lesion and the operation have been at a higher level than the first or second lumbar, as below that point there are only the bundles of nerve-fibres which constitute the termination of the cord and the cord itself. 1. *As to the nature of the spinal and cord lesions. a.* Of course the spine may be fractured without injury to the cord. In the absence of all symptoms, no one would think of operating. *b.* If the arches alone are fractured, operation is clearly indicated. *c.* The propriety of operation is much more doubtful when the spinal lesion affects the bodies also or even the bodies alone. Felizet and other partisans of operating have said that in these cases the cord is compressed between the anterior face of the arch and the posterior face of the fragment of the body; and that if the cord is severed death is certain at any rate, while if it is not severed operation may result favorably. Chedevergne, on the contrary, believes that the cord is so fixed by the attachments of the pia mater that it is wounded or divided by the anterior fragment, but cannot be compressed between that fragment and the arch. Menard denies this fixity in a study of the mechanism of indirect fracture of the vertebral column in the dorsal and dorso-lumbar regions.

Thorburn has divided vertebral fractures into three classes: 1, those in which after death we do not find the canal notably narrowed, the displaced bones after the accident having resumed their proper position, leaving the cord contused, or even pulpefied, but free from pressure,—these cases constituting the majority; 2, those in which the displacement is permanent and the cord is compressed; 3, those rarer cases in which pressure upon the cord is due to intraspinal hemorrhage.

In the first of these groups, it must be admitted, all intervention is useless. In the third group, that of hemorrhage into the canal, operation would be of great advantage, but such hemorrhages are very difficult to diagnose. In the second group, which according to many surgeons is the most frequent, Thorburn believes that cure is scarcely possible, as he thinks that the clinical testimony shows that the damage done by acute compression of the cord is usually irreparable. This is contradicted to a certain extent by the experiments of Brown-Séquard and others already quoted. Certainly, however, the most favorable cases are those in which the cord is only partially destroyed or slightly altered: so that the two great questions which present themselves to an operator in the presence of a fracture of the spine are: 1, Is the cord now compressed by a fragment of bone? 2, has the cord been completely destroyed, partially destroyed, or simply contused?

In regard to the first question, we should examine attentively the deformity, and the relation of the posterior arches and of the articular processes, and can sometimes, but by no means always, arrive at a correct conclusion. As to the second question, the complete disappearance of both sensation and motion below the lesion would indicate the complete transverse destruction of the cord. The disappearance of either one or the other alone, especially when localized on one side or at certain points, indicates a partial destruction. It will be understood, of course, that such localized or partial paralyses after fracture are extremely rare. When they do exist, however, they constitute a valuable guide to the operator.

MacDonald thought that a disappearance of sensation less complete than that of motility indicated medullary compression without destruction. Tillaux thought that the preservation of the muscular sense indicated simple compression. The condition of the reflexes is one of the most important elements in the problem. Tillaux says that while the exaltation of the reflex has been considered as a sign of destruction of the dorsal or cervical cord, he believes that in cases of fracture in the lumbar region its absolute disappearance would generally be a sign of such destruction, because although the cord acts with more vigor

beneath the cervical lesion, it could not do the same in the lumbar region, since beneath that there is no cord, so that in lumbar fractures the persistence of reflex action is the favorable sign and its abolition the unfavorable one. Bastian and Bowlby have recently investigated the same subject. The former found that in two cases of fracture of the spine in the lower cervical and upper dorsal regions there was complete abolition of reflexes; but at the autopsy cord lesions were limited to the level of the traumatism, and the lumbar region presented no change except the secondary degeneration. Bowlby says that he has observed twenty-two cases of cervico-dorsal fracture. In two the reflexes were exaggerated, and the cord was not completely destroyed. In the twenty other cases, of which fifteen were verified by autopsy, and in which the transverse destruction of the cord was complete, the reflexes were completely destroyed, even in one case where the patient lived for ten months.

According to this, therefore, the complete disappearance of reflexes below the lesion would be a valuable sign of complete transverse destruction of the cord.

2. As to the time between the accident and operation, both experimental and clinical facts show that the degenerative changes which are set up after a violent contusion or laceration of the cord take place with such rapidity that if *much* time has elapsed a large proportion of cases become hopeless. On the other hand, Horsley's case of tumor, and many cases of recovery from Pott's paralysis, with and without operation, show unmistakably that even long-continued pressure, almost to the point of obliteration, may be followed by a return to normal conditions.

3. As to the region involved, both theoretical and statistical considerations show that the lower dorsal and lumbar vertebræ are those which can be operated upon with the greatest hope of success. As to trephining in fractures below the level of the cord, that is to say, below the first lumbar vertebra, the results are, as might be expected, especially satisfactory. In looking at the statistics collected by Chipault, we find in fifty-six cases fifteen cures, of which two were complete (Péan and Lauenstein): the case of M. Péan was, however, a fracture of the posterior arch only. In three of the remaining thirteen (Blair, and Stemen, two) the seat of the lesion is not stated. The case of Alban Smith is without value, on account of carelessness in reporting. In three others (Walker, Potter, and Allingham), the lesions were seated about the lumbar region. In the case of Walker, however, the operation was done on the day following the accident, and it is not certain that a spontaneous cure might not have occurred. There was improvement in the cases of Edwards, Blackman, Gordon, Macewen, Lauenstein, Horsley, and Dawbarn, in which the lesion affected respectively one of the lumbar vertebræ, the sacrum, the twelfth dorsal or first lumbar, the twelfth dorsal, the junction of the twelfth dorsal with the first lumbar, the eleventh dorsal, the junction of the last two dorsal. In these seven cases the filum terminale was certainly affected in the first two. In the third, the terminal portion of the cord was doubtless injured, and the vesical and rectal centres did not participate in the improvement. The same remark applies to the fourth case. In the fifth, the reparative process appeared to have taken place in the cord itself. In the sixth, the improvement was associated with reparation of the nerves of the filum terminale, and not of the cord. In the seventh, the improvement was scarcely noticeable. Thorburn's rule is deserving of consideration in this connection, but should be contrasted with the remarks of Mr. Golding-Bird apropos of his case of fracture. Thorburn says that for the filum as for peripheral nerves the chances of cure do not seem notably diminished by expectant treatment. Experience shows, he says, that if a spontaneous cure is to take place it will begin early and will be progressive, and he thinks that, therefore, if at the end of six weeks there is no improvement, or if the improvement ceases, operation is indicated only then. In only one of his five cases did he have a complete cure, and then the lesion was confined to the filum, and a considerable quantity of cicatricial tissue compressing its nerves was removed.

I believe I have now given a fairly complete view of the history of this operation in cases of fracture and luxation, and with sufficient detail to permit of a reasonable estimate of its present position before the profession.

The arguments employed against operation in these cases of pressure upon the cord from fracture or displacement may be summarized as follows. It was said that there was great difficulty of diagnosis between the cases in which the operation would probably prove useless and those in which it would probably afford relief on account of the limited extent of the injury. This is undoubtedly true, but a precisely similar argument will apply to many other serious and frequently-employed operations, and all the most recent additions to our knowledge of the subject, whether derived from clinical experiments or from experimental and pathological investigation, lead us to assign to the cord a much greater power of repairing damage than was formerly thought to be possible.

It was said that the position of the fractured

bone often rendered it impossible to reach it, and that the pressure was commonly from the bodies of the vertebræ which could not be removed. A careful review of reported autopsies shows that the proportion of cases in which the pressure is from the laminæ is greater than has been supposed, and that this assertion is as true now as when originally made by Mr. Nunneley twenty years ago.

It is easy to demonstrate that the too sweeping statements which have been quoted, as to the extreme rarity of direct compression by the arches and spinous processes, are not fully justified by the facts. I append a number of references to cases of this character, selected almost at random from medical literature, while seeking information as to other points. They might be greatly multiplied.* They demonstrate that, in addition to the relief which we may perhaps expect to give by removal of the laminæ even in cases of compression by posterior displacement of the bodies, we may expect, in a proportion larger than has been generally supposed, to remove completely and permanently the actual compressing and irritating factor, thus giving the cord an opportunity for reparative action if it has not been hopelessly crushed or disorganized,—an opportunity which could not occur if the patient were left to the unaided processes of nature.

Of the cases of resection for fracture and luxation which have thus far been recorded, I find that in no less than forty-five per cent. was there a fracture of the laminæ or processes,—a percentage which, while it is undoubtedly far in excess of the actual frequency of this form of fracture, should yet be studied in the light of the statement made by the opponent of the operation,—viz., that it is impossible to tell with accuracy the extent of the damage and the particular parts involved. If this impossibility really exists, it is all the more important that we should not lose sight of the fact that the injury *may* be one quite relievable by operation.

Even when the pressure is anterior, having been caused by displacement or fracture of the

* Perhaps the following case, recorded by a distinguished neurologist, will serve as well as any as an example of a group of cases which a very little research shows to be by no means infrequent.

Dr. Charles K. Mills has reported (*The Polyclinic*, vol. i., No. 9, 1884) the case of a man who had been crushed by the roof of a building falling upon him; he had motor and sensory paralysis, never recovered, and died of exhaustion five years later.

A post-mortem examination was made thirty hours after death by Dr. Flick. The vertebral column had been fractured at the position of the twelfth dorsal and first lumbar vertebræ. The posterior portion of the upper of these bones had been broken and driven inward, and its fragments were overridden by a portion of the lower injured vertebra. The dura mater was adherent to the bone at the seat of the fracture. In the external layer of the dura, just at the lower end of the spinal cord, was a bony mass, one-half inch long by one-fourth inch wide. The membrane, for a short distance above this point and down to the cauda equina, was much thickened and covered with a dirty exudation. The cord at this point was red and very soft. The spinal canal contained a large effusion.

Dr. Mills, in reporting this case, said, "This mass which was like the bony concretions sometimes found in the falx cerebri, could have been removed by operation, after elevation of the depressed and broken spinal arch."

He adds, "In another case operation might have been of benefit if performed immediately after the accident. The most important features of this and the first case were as follows. A history of severe injury to the middle and lower spine; this was followed at once by pains in the back and limbs, spinal rigidity, anæsthesia, and paralysis of the lower limbs and of the bladder and bowels. The condition remaining was one of motor paralysis, wasting, contraction, depressed electro-contractility, coldness and lividity, peculiar zones of anæsthesia, and abolition of the tendon reflexes in anæsthetic regions. In this second case, at the upper edge of the twelfth dorsal vertebra adhesions were found which continued down the canal for three or more inches. At the commencement of the cauda equina, which was about the centre of the adhesion, caries of the first lumbar vertebra was found, the portion involved being the inner surface of the laminæ close to the junction of the body. Above and below the caries the adhesions were most persistent. The conus medullaris, cauda equina, and membranes were a glued mass; for an inch or two above and below this the membrane was considerably thickened, a deposit being present of a calcareous nature ("Spinal Localization," THERAPEUTIC GAZETTE, May 15 and June 15, 1889).

Cases more or less similar, but agreeing as to the occurrence of fracture of accessible portions of the vertebræ, have been reported by Astley Cooper; Hamilton, "Fractures and Dislocations;" Stephen Smith, *N. Y. Journal of Medicine*, vol. vi., 1859; Curling, two cases, "London Hospital Reports," vol. i.; Van Dyck, *N. Y. Journal of Medicine*, vol. iii., 1857; Eberman, *Am. Journ. of Med. Sci.*, October, 1879; Arnott, *Lancet*, 1851; Bransby Cooper, *Lancet*, 1828; Williamson, *Dublin Quarterly Journal*, vol. xxvii.; Boyer, "Surgical Works," vol. ii.; C. S. May, *Am. Journ. of Med. Sci.*, October, 1876; Erichsen, "Science and Art of Surgery;" Malgaigne, "Treatise on Fractures" (Packard's translation), *N. Y. Journ. of Med. and Collat. Sci.*, September, 1849, p. 268; Hamilton, "Treatise on Fractures and Dislocations;" "Guy's Hospital Reports," vol. ii. p. 480; F. H. Hamilton, Jr., *American Medical Times*, N. S., vol. viii.; Berkeley Hill, *Trans. Royal Med. and Chirurg. Soc.*, January 22, 1867; Abernethy; J. Comstock, *Boston Medical Journal*, 1848; William Pepper, *Trans. Patholog. Soc. of Phila.*, 1867; T. B. Ladd, *Boston Medical Journal*, 1852; A. P. Clarke, *Journal of the Am. Med. Association*, October, 1884; S. D. Townsend, *Am. Journ. Med. Sci.*, O. S., vol. xxii.; J. Solis Cohen, *Trans. Patholog. Soc. of Phila.*, 1878.

vertebral body, removal of the posterior arches increases the calibre of the canal, and increases also the chance of avoiding irreparable damage to the cord by compression. That it is unsafe to say in any given case that the cord is *hopelessly* damaged would seem to be fairly well established by the results of such cases as Horsley's, Macewen's, and Lauenstein's, so that operation should scarcely be refused on that score alone.*

A still further argument was that the exposure of the cord and membranes to the air would inevitably set up a destructive inflammation, an argument which in these days of antiseptic surgery need not further be considered. The general conclusions that the operation was too difficult, was too prolonged, that there was danger of fatal hemorrhage, etc., were, as experience has shown, largely theoretical; and although the operation is certainly not an easy one, and although one operator did lose his patient on the table from hemorrhage while attempting to perform it, it is still one which may be confidently undertaken by any experienced surgeon.

In reviewing the statistics of these operative cases, it seems to me quite proper that those belonging to the pre-antiseptic period should be omitted, or should be regarded in a category by themselves. I do not mean that all, or even a majority, of the fatal cases were due to septic disease. In many of them the time was too short, in others death resulted from intercurrent disease of other organs; but a sufficiently large proportion were so distinctly septic as to invalidate any sweeping conclusions based upon the results, sepsis after this operation being as absolutely avoidable as after any other in surgery. This would leave, then, in a class by themselves, the thirty-six operations for fracture of Macewen, Morris, Horsley (two), Lauenstein, Lucke, Albert, Duncan (three), Péan, Allingham (two), Dawbarn, Thorburn (five), Dandridge, Deces, Jaboulay (two), Abbé (three), Pilcher, Manley, Bell (two), Armstrong, Halstead, Pinkerton, Golding-Bird, Richardson, Knox, with six complete recoveries, five recoveries from the operation with benefit, eleven recoveries unimproved, and fourteen deaths,—a mortality of thirty-nine per cent.

The chief strength of the opponents of operation lies in the argument that the operation *per se* is of great danger, or in itself materially diminishes the patient's chances. If, as I believe to be the case, it can be fairly claimed that rapid reunion of all the soft structures down to the dura mater itself can be confidently expected; if it can be shown, as it has been, that extensive resections of the laminæ do not greatly or permanently weaken the spine; if under antiseptic methods the risk of consecutive inflammation of cord or membranes is practically *nil;* if hemorrhage is not to be feared, and if loss of cerebro-spinal fluid is unimportant; if it happens not so very infrequently that the cord is directly compressed by fragments of the laminæ themselves, or, if not, that by removal of the arches relief from anterior pressure *may* be afforded,—if these are facts, or even reasonably strong probabilities, it is evident that the operation is one which should

* In his article in "Holmes's Surgery" (vol. iv. p. 130), Alexander Shaw says, "Changes of the most extraordinary magnitude may be effected in the brain and cord by encroachments of various kinds, without the sacrifice of their functions, on condition that the intrusion is made slowly and gradually." This opinion has been reiterated even by surgeons who, like Mr. Shaw, earnestly oppose resection, and is used as an argument for trusting the patient to the *vis medicatrix naturæ*. Professor Eve has brought together (*Amer. Journ. of the Med. Sciences*, July, 1868) eleven cases of supposed division of the spinal cord in which life was variously prolonged, and in one of which recovery was complete. In the lower animals the results of vivisection experiments have been somewhat contradictory, but on the whole sustain the view that the cord, like other nerve-trunks, possesses extraordinary regenerative power. In some animals true nervous matter is introduced after part of the cord has been destroyed; at least this is so in tritons and lizards (Müller). As is well known, in these animals when the tail is removed it is reproduced, and Müller found that a part of the spinal cord corresponding to the new part of the tail is reproduced. Morphologically the elements were the same, but the spinal nerves were not reproduced, while physiologically the new nerve-substance was not functionally active. It corresponds, as it were, to a lower stage of development.

According to Masius and Vaulain, an excised portion of the spinal cord of a frog is reproduced after six months; while Brown-Séquard maintains that reunion of the divided surfaces of the cord takes place in pigeons after six to fifteen months. A partial reunion is asserted to occur in dogs by Dentan, Nannyn, and Eichhorst, although Schieferdecker obtained only negative results, the divided ends being united merely by connective tissue (Schwalbe).

Eichhorst and Nannyn found that in young dogs, whose spinal cord was divided—not excised—between the dorsal and lumbar regions, there was an anatomical and physiological regeneration to such an extent that voluntary movements could be executed. Vaulain in the case of frogs, and Masius in that of dogs, found motility restored first and sensation afterwards.

In 1882, Dr. Carl Maydl, of Vienna, conceived the project of resecting the whole thickness of the cord, and, after some successful experiments on dogs, actually opened the spinal canal of a man for that purpose, but found the conditions too unfavorable to proceed further. The patient recovered from the operation, but was not improved at all.

no longer be rejected on the sole remaining ground that we cannot be certain in any given case as to the exact amount of damage which has been done to the tissues of the cord. The argument that, if such damage were irreparable, operative interference would be useless, while if the cord retained the power of recovering itself the operation would only add another complication, has lost nearly all its force. It would seem rather to be the duty of the surgeon, after a reasonable and not very protracted delay, to endeavor to relieve any possible pressure, to remove any fragments or spiculæ of bone, to drain thoroughly the canal or even the subdural space if there be any oozing, and to do so with the consciousness that, if he meet with none of these conditions, he is at any rate not performing a necessarily fatal operation.

Chipault comes to the following conclusions: 1. Trephining is useless when, the cord having been contused, the fragments displaced at the time of the traumatism have returned to their normal position. 2. Trephining is almost certainly useful (*a*) when the cord is compressed between a vertebral body and a posterior arch; (*b*) when there is medullary compression from spinal hemorrhage. In these two conditions the least possible delay is advisable, on account of the extreme rapidity with which secondary degenerations occur.*

3. Trephining is absolutely indicated (*a*) when the symptoms are due to compression of the cord by fragments of the arches or laminæ; we should then operate as early as possible; (*b*) when there is compression of the filum terminale from any cause,—that is, from either anterior or posterior fracture or from the presence of cicatricial tissue. We should operate at the end of the same month if improvement has ceased for a few weeks.

Unquestionably, if for any of the above reasons we decide to operate, the earlier the operation is done the greater the probability that it will be of benefit. In the presence of depression of arches or laminæ, immediate interference is justifiable, as it is in cases with recognizable symptoms of spinal hemorrhage. In the absence of these conditions, and weighing fairly the fact that even in recent times and in good hands there have been but seventeen per cent. of complete recoveries and a mortality of thirty-nine per cent. after this operation, the safest rule with which I am familiar is that which has been formulated by Lauenstein,—namely, that if after the lapse of from six to ten weeks there is incontinence of urine, with cystitis or incontinence of fæces, and especially if there is also the development of bed-sores, little is to be hoped for from the unaided efforts of nature. If, however, these these symptoms be absent, and if there be the least improvement in either sensation or motion, it will be proper for the surgeon to delay operative interference still longer.†

* "I might give many illustrations gathered from medical and surgical literature of intraspinal hemorrhage in which operation would probably have proved successful, but I will confine myself to two, one twenty-two years old and the other a recent case.

"Jackson (*Lancet*, July 3, 1869) reported an interesting case of localized spinal apoplexy, which with our present lights might perhaps have been relieved and a life saved by careful trephining. The patient was a bright girl, 14 years old. While dressing, her fingers felt weak. The next day she had a similar weak feeling in her hands. One day later she was unable to move her arms except at the wrists. Later, the intercostal muscles did not act quite freely, and she seemed to lie heavier in the bed. Moist crepitant râles, with a little cough, developed. On the fifth day after the first symptoms, careful examination clearly demonstrated great loss of power in all the voluntary muscles of respiration and in those muscles of the arm, back, and chest supplied by the cervical nerves. The diaphragm became fixed, and there was slight lividity about the cheeks, with a fall in the natural temperature. Sir W. Jenner, who was called in consultation, diagnosticated a clot in the cervical portion of the spinal cord. The whole cervical portion of the spine, but particularly in front and to the left, was embedded in an oblong clot of dark venous blood outside the membranes. The clot ceased at the seventh cervical vertebra.

"In this case, as the reporter remarked, the effusion probably took place very gradually, had room to extend itself, and coagulated very slowly and imperfectly. Until the phrenic nerves were interfered with, nearly every symptom might have been attributed to hysteria.

"The following case was reported by Dr. Arlidge to the Staffordshire branch of the British Medical Association (*Med. and Surg. Rep.*, March 23, 1889, vol. lx., No. 12, p. 370). The patient, 44 years old, a drinking man, was admitted to the infirmary with complete motor paralysis of the legs and some weakness in the arms, where, too, formication and numbness were experienced. Sensation was normal, and the legs were painless and their reflexes abolished. His only complaint was of dorsal pain. The bladder was distended, and prior to admission had been emptied by the catheter, but there was no dribbling of urine. Some bronchial râles were noted in the upper part of the left lung; heart healthy; bowels confined for four days; the cerebrum undisturbed. The first temperature taken was 103.6°, but the next day it fluctuated between 105° and 106°, and rose to 107.4° the day preceding his death, and was accompanied by delirium. A post-mortem examination revealed a copious hemorrhage within the meninges of the spinal cord, extending downward from the last cervical vertebra for about six inches. The blood was coagulated. No ruptured vessels were found in the cord itself, and no cerebral disease, although the dura mater was very adherent to the skull. There was no fracture of the spine, and no caries of any vertebra" (Chas. K. Mills, "Spinal Localization," THERAPEUTIC GAZETTE, May 15 and June 15, 1889).

† All operators upon cases of fracture paraplegia of any duration have thus far arrived at about the same conclusion,—namely, that the pressure of bone is of secondary importance, except the fracture involves only

In conclusion, I desire to speak briefly of the operation itself, which has been variously described as "formidable," "appalling," "well-nigh impossible," "desperate and blind," and in other similar extravagant terms. In one case the patient is said to have died on the table from hemorrhage; in another the operation was abandoned on account of the supposed impossibility of its completion. It has not seemed to me that these descriptions are in the least justifiable. The operation is, indeed, as was said by McDonnell, apt to be tedious and tiresome; but, so far as any major difficulties are concerned, it is not to be compared with many much better known, and much more frequently practised, operative procedures. I base this opinion both upon experiments on the cadaver, and upon my experience with the cases in which I have performed resection. It may be useful to give the details of the method which seems to be preferable:

The patient having been placed in the prone position, and a gentle curve having been given the spine by means of a firm, small pillow placed under the lower ribs, a long incision should be made directly down to the tips of the spinous processes, the middle of the incision being opposite the supposed site of the tumor, the apex of the angle, or curve, if the case be one of Pott's disease, or the deformity, or displacement, if the case be one of fracture or luxation. The muscles should then be freely separated from the sides of the spinous processes and the posterior surfaces of the laminæ, the edge of a stout, thick-backed scalpel being used for this purpose. One side of the spine should be cleared, and all hemorrhage arrested by the use of hæmostatic forceps, before the other side is approached, and the wound should be filled with sponges, or a towel wrung out of a hot antiseptic solution. This having been done, the other side may be treated in the same manner. By the time the spine is thoroughly exposed on the second side, most of the bleeding will have permanently stopped on the other; but any distinct spirts or free oozing following the removal of the catch-forceps should then be permanently arrested by ligature, after which the periosteum may be reflected by making a firm incision through it along the angle between the spinous processes and the laminæ, turning up its edge at this point with the help of dissecting forceps, and then scraping the surfaces of the vertebral arches with a curved periosteal elevator. This being completed, the hemorrhage should be similarly arrested, and the perios-

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the arch, where it is driven in by a blow, inasmuch as the violence, usually a fall and bending of the back, which will produce instant paralysis, has done so by a diastasis of the vertebræ, the cartilages being ruptured and the arches broken, which completely pulpifies the spinal medulla. The vertebræ are very apt to resume immediately their usual relations. If, however, the fracture takes place at or below the last dorsal, where the medulla has disappeared and the firm cauda equina commences, the crushing does not usually destroy the nerves, but long bone-pressure would do so. In such cases operation to correct it is always desirable. It still remains a problem, perhaps never to be solved, how to connect the lower segment of the cord with the upper when there is a gap of half an inch, and whether this union would restore functional connection with the brain, even though its reflex and independent activity might be ever so good. The cases may yet be found where sufficiently narrow transverse lesions will allow the suturing of fresh-cut ends of the cord.

In other cases it remains yet to try the suturing of nerve-roots from above the breaks into some one or two below, sacrificing only the cutaneous supply for a small area, as suggested by Dr. Dana, or, as seems feasible, implanting them into the cut end of the lower stump, thus perhaps innervating some limited portion of the distal end with the chance of stimulating more. Possibly in this way even the vesical control alone might be restored. This is conjecture entirely, and is based on the fact that clean-cut nerve-sections will unite" (Robert Abbé, *New York Medical Record*, vol. xxxviii., 2, pp. 85–92).

Dandridge remarks that "the question of operative interference in spinal surgery must be considered in reference to interference immediately after the receipt of injury, and interference deferred until the amount and character of permanent disability can be determined. The solution of these questions involves a consideration of the source and results of fracture treated without recourse to operation. It is well known that not only a considerable number of these cases escape death, but entirely recover all their functions, even after the existence of paralysis, incontinence, and bed-sores existing for a variable length of time. In a valuable paper Burrell has investigated the results of all the cases which have occurred in the Boston City Hospital, eighty-one cases in all, of which eighteen survived. Divided into regions, we find twenty-eight cases of fracture of the cervical vertebræ gave two recoveries; twelve cases of fracture of the upper dorsal vertebræ, six recoveries; nineteen cases of fracture of the lower dorsal, one recovery; twenty-three cases of fracture of the lumbar vertebræ, ten recoveries. Of the sixty-four fatal cases thirty-five died within five days, eight in from five to ten days, and seven in from ten days to a month. Five of these cases were submitted to operation,—all of which were promptly fatal. In the eighteen who survived, the result was good in nine, and in nine complete disability remained permanent. The especial value of Burrell's paper is that it is based on the entire number of cases treated in a single institution, and gives, therefore, more reliable data for deductions than statistics made up of isolated cases. Favorable results always obtain undue prominence under such circumstances. It is apparent from the above figures that twenty-one per cent. of fractures of the spine survive, and that over ten per cent. make a satisfactory recovery.

"Of the fatal cases, a very large proportion die in the first few days,—a fact of importance in estimating the danger of operation, the high mortality of which in cases of recent injury cannot properly be attributed to the operation itself, but is largely due to the concomitant injury.

"It is further evident that, while treatment is successful in preserving the lives of a considerable number, one-half the survivors are left completely disabled: so that any addition to our therapeutic resources must be eagerly welcomed" (*Journal of the American Medical Association*, 1889, vol. xiii., 2, pp. 39, 40).

teum reflected on the opposite side. Cline and Tyrrell used broad angular plates as retractors on each side; Gordon divided the attachment of the muscles to the articular processes, which, he said, gave plenty of room, as each end of a muscular bundle when separated from its attachment retracted of itself and needed little holding back with the fingers; Horsley divides the deep fascia at right angles to the line of the incision opposite its middle, in order to prevent its resisting a proper separation of the sides of the wound, and says that it may be found necessary to divide this aponeurosis at more places than one. In my cases I found that retractors of moderate size, not large or clumsy enough to be in the way, were all that was needed to keep the muscular masses from interfering with the subsequent procedures. The next step, and one which greatly facilitates the remainder of the operation, consists in the division of the spinous processes close to their bases by means of large, strong bone-forceps set at an obtuse angle. That was not done by most of the earlier operators, but it certainly adds nothing to the severity of the operation, while affording much freer exposure of the laminæ, which are the next parts to be attacked. In perforating these, Cline advised the use of a small crowned trephine to cut through the vertebral arches, if requisite,—that is, if they were not already broken into more than two pieces. Tyrrell found Hey's saw most convenient. In Gordon's case one side of the arch was broken and the yellow ligament torn through, admitting the entrance of his finger, so that he merely divided the other side of the arch with a pair of stout bone-forceps; Lauenstein employed a chisel; Horsley returned to the use of the trephine, but says that if more than one arch is to be removed it will be better by means of an angular saw to cut partly through the laminæ along the lines of the sides of the neural canal, and then the division of the bones can be completed with the bone-forceps. I have found that both the trephine and the saw are unnecessary, and that the laminæ can be more expeditiously, and with equal safety, divided by the use of a pair of very strong bone-forceps, either straight or having a large obtuse angle, as may be preferred by the operator. The vertebra at the centre of the incision should be selected, and the vertebral spaces above and below its laminæ should be recognized with the tip of the finger. The points of the bone-forceps should then be placed above and below its edges, and the laminæ cut through by successive short nips, the line of section being as close to the transverse processes as possible. This gives the greatest exposure of the cord and of the membrane itself.

Abbé's procedure is as follows. The patient is laid prone, but with one shoulder raised by a sand pillow,—favoring easier respiration and inclining the back towards the operator slightly. A free incision is made parallel to the spines and a half-inch to one side, cutting the longitudinal attachments from one side only, and being carried clean down to the laminæ at the second or third pass of the knife. To approach the fracture the incision is made from one or two vertebræ above to an equal distance below; the laminæ are then cleared of muscles, which are drawn outward by retractors, and the ligament divided so as to isolate a block of four spines, whose bases are then severed from their arches by stout cutting pliers.

This manœuvre at once allows a retraction of the entire block of connected spines with their muscles still arch is thus exposed without sacrificing the overlying tissues. A pair of slightly-curved rongeurs are then applied to the lower edge of one lamina, and with incredible ease the entire breadth is quickly gnawed away.

Abbé claims that this is the most speedy, the least bloody, preserves all the tissues in and about the spines which are replaced, and gives firmness to the back, as well as prevents a gap that nature would be obliged to fill. The incision should be on one side of the spines only, they being cut off and dragged to the other side, exposing the entire arch without dividing the interspinous ligament. The only bone-cutting instruments to be used are two very narrow rongeurs, one curved, one straight, with a quarter-inch bite and presenting a flat Gothic arch aspect when the points are brought together. Abbé thinks that the saw is dangerous, awkward, and inefficient, and that the rongeurs are by far the quickest.

The color of the dura should be noted, particularly with the view of determining in cases of traumatism whether it is or is not necessary to open it. If it be dark or purplish from the presence of exuded blood beneath it, or yellowish from the presence of pus, it will, of course, be proper to incise it in order to empty and to explore the subdural space. My own feeling is that in all cases in the future in which this operation is performed for supposed tumor, and the growth is not found lying upon or external to the dura, that membrane should be freely and fearlessly opened for exploration purposes. The resulting escape of the cerebro-spinal fluid has been found to be merely one of the bugbears of the subject, and is certainly not to be weighed against the chance of terminating the operation without discovering a possibly existent and relievable condition. If it is determined to open it, it may be picked up in the median line and at the middle of the incision with a pair of delicate toothed forceps, nicked with a knife or the scissors, and then divided either upon a director or with a pair of blunt-pointed scissors to any required extent upward or downward. It can be easily and gently retracted to either side, so as to expose the whole posterior surface of the cord to both inspection and palpation, permitting the gentle insertion of the tip of the finger between its inner surface and the lateral aspect of the cord, and permitting also, if need be, the investigation of the anterior and antero-lateral subdural spaces by means of a blunt curved instrument, such as a pedicle needle or an aneurismal needle. The inspection having been completed, the tumor having been removed, and the pus or blood evacuated, or it having been determined that no indication for further operative interference exists, the incision in the dura should be stitched up with fine interrupted catgut sutures. These may be introduced very readily and speedily by means of a pair of staphyllorrhaphy needles, the one not in use being threaded by an assistant while each stitch is being put in place; the stitches should be inserted at intervals of about one-eighth to one-sixth of an inch, and when all are in place can be easily tied, the ends being cut off short. A small rubber drainage-tube and a dozen strands of chromicized catgut should then be laid throughout the entire length of the wound, the muscles being united above them by means of chromicized catgut sutures, after which the skin and aponeurosis are brought together by silk or silver wire, as may be preferred. It is hardly necessary to say that the most rigid antiseptic precautions

I may, in conclusion, briefly summarize the opinions I have arrived at after this consideration of this last branch of the subject.

1. Some objections urged against operative interference in spinal traumatisms—*i.e.*, hemorrhage, frequency of absolute destruction of the cord, pressure from inaccessible fragments of bone, etc.—have been shown to be unsupported by clinical facts; others were largely due to a well-founded dread of (*a*) the shock in those cases operated on in pre-anæsthetic times, and (*b*) consecutive inflammation, suppuration, and pyæmia in pre-antiseptic periods.

2. The results of recent operative interference in properly-selected cases of fractures of the spine are encouraging, and should lead to the more frequent employment of resection of the posterior arches and laminæ: (*a*) in all cases in which depression of those portions, either from fracture or from dislocation, is obvious; (*b*) in some cases in which after fracture rapidly progressive degenerative changes manifest themselves; (*c*) in all cases in which there is compression of the cauda equina from any cause, whether from anterior or posterior fracture or from cicatricial tissue; (*d*) in the presence of characteristic symptoms of spinal hemorrhage, intra- or extra-medullary.

3. Operation is contraindicated by a history of such severe crushing force as would be likely to cause disorganization of the cord. The question which will remain in doubt previous to operation will usually be that of the extent of damage done to the cord and the possibility of its taking on reparative action. As to this, the safest rule is that which has been formulated by Lauenstein,—namely, that if after the lapse of six or ten weeks there is incontinence of urine with cystitis, or incontinence of fæces, and especially if there are also the development and spreading of bedsores, but little is to be hoped for from the unaided efforts of nature. If, however, these symptoms be absent, and if there be the least improvement in either sensation or motion, it will be proper for the surgeon to delay operative interference still longer.

PRELIMINARY NOTE ON THE PHARMACOLOGY OF SALICYLAMIDE.

By W. B. Nesbitt, M.D., Toronto, Canada.

THIS compound is one of a series which I have been experimenting with in a study of the modification of physiological action the action of the amidogen radical NH_2 being chiefly considered.

In this connection I might mention that a few years ago I made some notes on the introduction of the amidogen radical into chloral,* as it occurred to me from my experiments that this combination might be of benefit. Although it has not been therapeutically tested, yet Dr. Langaard, in an article† on the "Newer Hypnotics," says that the great majority of these—chloral-formamide, chloralamide, chloral-urethan, etc.—are based upon the principle of introducing the stimulating amidogen radical into chloral, mentioning as the originator of this method chloral-ammonium.‡ So that I feel that if a tenth of the claims made for chloralamide are true my work has not been in vain.

As stated of chloral-ammonium, so of salicylamide, I give these notes with the belief that this compound may be of value for two or three reasons:

1. It is a modification of a long and favorably known remedy,—salicylic acid.

2. It is as tasteless as the latter is unpleasant.

3. If, as stated by Schmiedeberg, Brunton, and numbers of other pharmacologists, there is an especial stimulating action in the amidogen radical, it should be safer than salicylic acid.

It is the amide of salicylic acid, with the formula

$$C_6H_4{<}^{OH}_{CONH_2}.$$

First prepared by Limpricht, it is described by him§ as made by the action of concentrated ammonia on methyl-salicylate. It crystallizes from ether in lustrous yellow plates, and sublimes when carefully heated. As a phenol, it forms metallic salts; its ethers are formed when ammonia is allowed to act upon the ethers of salicylic acid.‖

I have prepared it by the action of concentrated ammonia on oleum gaultheria, which is chiefly composed of methyl-salicylate. This method, although causing greater difficulty in separating out a pure salt, as a large quantity of very soluble brown coloring-mat-

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* Therapeutic Gazette, February, 1888.

† *Therapeutische Monatshefte*, October and November, 1889.

‡ Therapeutic Gazette, *ibid.*

§ "Annalen der Chemie und Pharmacie," vol. xcviii. p. 258.

‖ Roscoe and Schorlemmer, vol. iii., Part IV., p.

ter is formed, has the advantage that no toxic substances are formed, as has been the case in the manufacture of artificial salicylic acid.*

I have also prepared it by heating ammonium-salicylate. This, although a common method for the preparation of the amides of the fatty series, has not been used for salicylic acid, and I mention it chiefly to show the difference between ammonium-salicylate and salicylamide.

When ammonia and oleum gaultheria have stood together in the cold for some days, the liquid assumes a deep reddish-brown color, and brownish crystals begin to separate; all impurities are, however, readily removed by a few recrystallizations.

The method of crystallization depends upon the rapidity of cooling and saturation of solution. If rapidly cooled from a *saturated* solution, they appear in fine acicular tufts. The usual method of crystallization, however, is either in thin long plates or bunches of these. It is easy to procure by means of charcoal perfect colorless crystals and in thin transparent plates; melting-point, 142° C.; soluble in alcohol, ether, chloroform, and water; about twice as soluble in cold water as salicylic acid (1 in 250), but readily soluble in hot water. It is quite tasteless, and gives a somewhat gritty sensation between the teeth. Its chemical relations are readily shown by a comparison of the structural formulæ:

$C_6H_4<^{OH}_{COOH}$ Salicylic acid.

$C_6H_4<^{OH}_{CO,NH_2}$ Salicylamide.

$C_6H_4<^{OH}_{COOHNH_3}$ Ammonium-salicylate.

After administration its presence is speedily recognized in the urine by the violet coloration on addition of ferric chloride, following the white precipitate of phosphate of iron which is first produced. It is excreted to a slight extent unaltered, but chiefly as salicyluric acid, or, more correctly, hydrocyanic hippuric acid. In this respect it differs from amides of the fatty series; for instance, acetamide, which is excreted unchanged.† It has a decided effect upon the urine, in that it prevents putrefaction for months.

Passing from the more purely chemical side to the physiological, I find that both the diastatic and peptic changes are retarded by it, but not to the same extent as by salicylic acid. It lowers the coagulating point of albumen by five per cent., and from this we would expect that oxidation would be diminished, but testing protoplasm with guaiac in its presence it gives very slight retardation. This may be due to the fact that, although the coagulating point is lowered, it is not to any great extent.

As mentioned above in connection with the urine, it shows decided germicidal properties. On testing this by inoculating Cohn's fluid, in which salicylamide was dissolved, with micrococci and bacteria, it was found that a strength of 1 in 500 prevented all development, while 1 in 750, though preventing development of bacteria, did not prevent development of micrococci.

In very dilute solutions it paralyzes the amœba, and eventually kills them, though, if washed with fresh water just after paralysis takes place, movement recommences. This is likewise true of its action on the leucocytes of human blood.

Brunton states‡ that, as a general rule, most of the compound radicals formed by the union of amidogen with the radicals of the marsh-gas series possess a paralyzing action on motor nerves. I think this may be stated with equal truth of the union of amidogen with members of the aromatic series. On administering salicylamide *per os* in toxic amounts to frogs there is a uniformity of symptoms. First, a period of decided but temporary excitement, with slight quickening of respiration and engorgement of superficial veins: concomitant with this there is an approaching general failure of movement, which first appears in the lower extremities, the frog still keeping up active movements of the fore legs, but this shortly ceases and the frog gradually dies. If the chest-wall is opened and the heart examined, it will be found to be beating very rapidly with perfect rhythm, but towards death it slows down and rhythm ceases, the auricles beating often as many as 8 or 10 beats to 1 of the ventricles, and the heart finally ceases in great diastole, engorged with venous blood; in fact, for some time before death, this venosity of the blood is characteristic.

On examination of its action on the different structures of nerve, muscle, cord, etc., the following may be observed:

* "Artificial Salicylic Acid," in *British Medical Journal*, 1890.

† O. Schutzen and Mencki, *Virchow's Archiv*, Band

‡ Brunton's "Materia Medica and Therapeutics,"

1. *Action on Nerves.*—In the frog poisoned by salicylamide, when loss of movement ensues, a blow on the extended leg produces no effect, but a pinch after a short delay (the delay depending upon extent of poisoning) will cause the frog to draw up both legs. It thus seems to have an action similar to that of many analgesics, the irritation causing a diffusion of motor impulse in the cord.*

On performing Türck's experiment † for determination of reflex action, the result is found to be completely confirmatory of the above, so that there is no central effect. In Türck's experiment the diffusion of motor impulses is likewise shown, as on irritating the toe with the acid, after a short interval, both legs are drawn up at the same time. From this it was necessary to test the action on the exposed nerve, the sciatic being used. Here the salicylamide was found to destroy the power of the nerve impressed in it long before the other one.

The next point to ascertain was whether there was any change in nerve-conductivity. To do this the sciatic was exposed, and under it was placed a strip of rubber, which held some salicylamide on the middle of the exposed portion of the nerve. The nerve was now irritated by a current above and below the point of application of the salicylamide, both giving muscular contraction. Irritation was made every two and a half minutes, the result being that in twelve and a half minutes irritation above had no effect, while irritation below gave reaction for more than two hours.

The supposition that it is motor-conduction in the cord that is interfered with, as stated before, is further borne out by the fact that when the animal is poisoned, the effect is seen first in the lower extremities, motion and power to move itself along persisting in the forelegs for some time after.‡ That the drug likewise has a certain effect on the conduction of painful impressions through the gray matter of the cord is evident from the fact that impressions which are ordinarily painful, as a blow, produced no reaction, while tactile impressions still produce reflex action.§ On muscle it was found to destroy the irritability, but not nearly so rapidly as in the nerves; for instance, a nerve-muscle preparation placed in a salicylamide solution (1 in 250), the reaction of muscle through the nerve was lost in ten minutes, whereas the muscle would contract on direct stimulation for four hours afterwards.

The effect of the salicylamide on the tetanic curve produced by the faradic current was very striking, as a fifteen-minute immersion was sufficient to almost abolish it.

2. *Action on the Heart.*—Having discerned its action on nerve and muscle separately, we are in a position to consider its effects on the heart. A few preliminary experiments showed that its general effect was first stimulation, and with greater rapidity and more complete systole and diastole, and then gradual slowing, with final stoppage in diastole. This latter effect may have been due to irritation of the inhibitory apparatus or paralysis of the motor apparatus.

Experiments made to determine the effect of administering the drug *per os* on the heart show that slowing still went on, despite the application of nicotine and atropine, showing that there was no irritation of central or inhibitory apparatus.

That the inhibitory apparatus was not interfered with was further determined by direct experiment.

The following experiments give a very complete picture of the process of exclusion in locating the action of the poison.

EXPERIMENT 1.

Time. h. m. s.	Pulse per 30 secs.	Remarks.
2.55.00	...	Pithed rana pipiens.
3.00.00	19	
3.05.00	19	
3.30.00	...	Vagi exposed.
3.33.00	19	Cold saturated solution of salicylamide.
3.34.00	18	
3.35.00	17	
3.36.00	17	
3.38.00	17	
3.40.00	14	Pulsation weaker.
3.42.30	14	
3.45.00	14	
3.46.00	...	Cold saturated solution of salicylamide.
3.49.30	13	As a rule the drug gradually diminishes the strength of pulsation concomitantly with the slowing. On irritating the vagus trunk the heart was stopped; therefore the inhibitory apparatus in the heart is not destroyed.
3.50.00	13	
3.52.30	13	
3.55.00	13	
4.00.00	13	

* Brunton's "Croonian Lectures" (*British Medical Journal*, 1889).

† R. Meade Smith "Experimental Pharmacology."

‡ Hughes Bennett, *Edinburgh Medical Journal*, October, 1873.

§ Brunton's "Materia Medica and Therapeutics," p. 703.

EXPERIMENT 2.

Time. h. m. s.	Pulse per 30 secs.	Remarks.
7.26.00	16	Administered 5 grains of salicylamide *per os* in a rana pipiens on opening chest-wall. Heart's action good, although extensive and almost complete loss of motion; sensation on pinching, slight response, but if pinched immediately afterwards, no response, as if the motor discharge sufficient for contraction was exhausted after one effort; sensation is also delayed.
7.30.00	14	
7.35.00	14	
7.45.00	12	
7.50.00	10	No attention to any stimulus, except conjunctival irritation.
7.52.30	9	
8.15.00	7	
8.20.00	8	Applied drop of nicotine solution to central control.
8.35.00	7	
8.40.00	7	$\frac{1}{100}$ gramme of atropine.
9.00.00	6	No inhibitory action.
9.15.00	.../	Heart excised and placed in NaCl. solution.
9.16.00	9	
9.21.00	9	Placed in salicylamide solution the heart made 7 beats, and then stopped.

EXPERIMENT 3.

Time. h. m. s.	Pulse per 30 secs.	Remarks.
4.50.00	...	Exposed heart and vagi in a rana pipiens.
5.00.00	20	
5.01.00	21	
5.05.00	20	
5.08.00	20	
5.09.00	...	Administered salicylamide.
5.10.00	18	
5.12.30	16	Pulsation weaker.
5.15.00	16	
5.17.30	15	Pause longer.
5.20.00	15	
5.22.30	14½	Vagi divided.
5.25.00	14	No central control.
5.27.30	14	No central control.
5.30.00	14	Gave nicotine.
5.32.30	10	
5.35.00	11	Not due to irritation of vagi roots in heart.
5.37.30	11	Not due to irritation of vagi roots in heart.
5.40.00	10	$\frac{1}{100}$ grain of atropine.
5.42.30	9	Not due to irritation of inhibitory apparatus.
5.45.00	8	Not due to irritation of inhibitory apparatus.
5.47.30	8	Pause much lengthened; rhythm good.
5.50.00	7	
5.52.30	7	Now washed out pericardial sac with salt solution; beats rose to 10 immediately for 10 minutes, then salicylamide was applied, and the heart stopped in 20 minutes.

As there was never any acceleration of the pulse in the excised heart, the accelerating apparatus need not be considered, and from the foregoing experiments the inhibitory apparatus has been completely excluded, so that there is only the motor centre and muscle-substance to deal with. This is undoubtedly the most difficult point in cardiac pharmacology, as we have to do largely with hypothesis.

In this case we find that in nerve and muscle experiments both are paralyzed, but the nerve long before the muscle. We likewise find that where the heart has stopped beating it can by electrical or mechanical stimulation be made to give a few more beats, eventually dying in systole. This would not be the case if we had complete loss of function in muscle as well as nerve, or a loss of function in muscle preceding the nerve paralysis. So that it may be safely stated that death is due primarily to action on the motor apparatus.

Approaching the still more difficult ground as to whether this action is on motor-discharge or motor-conduction, I have given preference to motor conduction, for the reasons that,—

1. In the experiments on the exposed sciatic conduction was absolutely abolished.

2. In nearly all experiments on the heart, the mode of dying has been 1 beat of auricle to 1 of ventricle, then 2 of auricle to 1 of ventricle, 3 of auricle to 1 of ventricle, etc., much in the same manner as in Gaskell's experiments with the clamp, where there was direct mechanical interference with conduction.

3. *Action on Respiration.*—The action on respiration in the frog is only of negative value, as death did not occur with convulsions. It was necessary to administer to mammals, because if in them death occurred by convulsions, it would be due to the action on the respiratory centre.

To test this, the drug was administered to a couple of chickens. In them it produced first an ataxic gait, then a condition of hebetude, and finally death, without apparent convulsions. There was also no darkening of the comb, which is so readily noticed where any serious blood-change is produced. As regards its further action on respiration and

blood in mammals, I have not yet made a sufficient number of experiments to speak authoritatively on more than one point,—that is, where it was given to two rabbits, in the proportion per kilo in which it gave decided symptoms in man, the kymographic tracing was not affected by it.

Of its action on temperature in health, in two experiments on myself, doses of 3 grains, with fifteen minutes intervals, nine grains in all, the temperature was lowered in one instance 1⅘° F., in another 2⅕° F., accompanied with ringing in the ears and decided chilliness. A sphygmographic tracing, taken at the same time at the same pressure (three ounces), before and after salicylamide, shows a dulling of the apex of the first stroke. It is generally conceded that no estimate of blood-pressure can be made by the sphygmograph; yet, as the same pressure was used in both instances, this would seem to indicate a lowered vaso-motor action, with reduction of temperature, due to capillary dilatation or increased heat-dissipation. This, however, I will endeavor to more accurately determine by subsequent calorimetrical experiments.

The following therapeutic notes may be of interest:

CASE I.—Mrs. M., suffering intense pain in right ovarian region, probably due to congestion, took 5 grains every three hours, and obtained relief after third dose, fifteen grains in all, being the largest quantity I have yet administered in that time. She complained of slight rash around waist and on one side of face, where she had been sitting near a fire; no other ill effects noticeable.

CASE II.—J. D., aged 11; follicular amygdalitis; rheumatic history; pain was relieved by 3 grains of salicylamide; the throat was clear on the following morning.

(I have notes of four similar cases.)

CASE III.—Park S., suffering from severe headache: temporal and facial arteries contracted; relieved by 3-grain doses every hour.

CASE IV.—Mrs. K., chronic rheumatism; attack of pain relieved by 5-grain dose; no depressing effect, although there was a cardiac complication present.

To sum up these results.

Pharmacologically it prevents conduction in nerve; paralyzes nerve first, then muscle.

On the heart, its chief effect being on motor apparatus, most probably through its activity on conduction.

Diminishes spinal reflex for motor impulses.

Diminishes spinal conductivity for painful impressions.

Diminishes muscular irritability.

In mammals no particular effect on respiration.

No particular effect on blood-pressure. In medicinal doses reduces temperature, causes ataxic gait, and hebetude in the fowls.

Therapeutically its advantages over salicylic acid and its salts are,—

1. It has no taste.
2. More soluble than salicylic acid.
3. It acts more promptly.
4. It acts in smaller doses.
5. It has greater analgesic properties.
6. It is pharmacologically safer.

In conclusion, my most sincere thanks are due to my former teacher, Professor W. H. Pike, for the kind manner in which, on this and previous occasions, he has allowed me the use of the chemical laboratory in University College, and also in the present instance to Dr. Charles Sheard for the loan of his physiological apparatus from the laboratory of Trinity Medical College. I feel great pleasure in thus being publicly able to thank these gentlemen, as they have thus done much to help me over the rough road of pursuing investigations, as we so often have to do, at the expense of our own pocket as well as our time.

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*THE LIMITATIONS OF BACTERIOLOGICAL THERAPEUTICS, WITH SPECIAL REFERENCE TO TUBERCULOSIS OF THE LUNGS.**

BY E. P. HURD, M.D., NEWBURYPORT, MASS.

I SHALL discuss my subject under three heads:

1. What is meant by bacteriological therapeutics?

2. The limitation of bacteriological therapeutics in infectious diseases in general.

3. The limitation of bacteriological therapeutics in pulmonary tuberculosis.

I. BACTERIOLOGICAL THERAPEUTICS PRIMARILY ANTAGONIZE BACTERIA.

There is now a general consensus of belief in the bacterial origin of all infectious diseases. That all communicable maladies, such as can be imparted from plant to plant, from animal to animal, from the animal to the human being, from one man to another, are due to

* Read before the Climatological Association, Washington, D. C., September 23, 1891.

micro-organisms, in such a sense that without the latter the diseases would be non-existent, is not now a matter for debate; there are sufficient scientific facts to prove the proposition in its application to many of them, and, from what we know of the uniformity. of natural laws, the inference is irresistible that all are microbic diseases.

Among the bacterial diseases of the lower animals whose causal agents are known, we may enumerate fowl cholera, the contagious acne of horses, pigeon-pox, American swine plague, European *rouget*, glanders, and charbon. Of diseases peculiar to man, the infectious agents of the following have, with sufficient certainty, been determined: typhoid fever, diphtheria, cholera, tetanus, pneumonia, erysipelas; and I believe that we are warranted in adding malaria, though the latter is not due to bacteria, but to infusoria.

The problem of tuberculosis has not been worked out in its entirety; there are still difficulties and contradictions which are hard to explain in accordance with the new etiology, yet on the whole the causal relation of Koch's bacillus to tubercle seems to have been sufficiently demonstrated.

The infinite variety and multitude of micro-organisms; their *rôle* in the phenomena of fermentation and putrefaction, and in the general break-up of organic life; the incessant struggle of the cells of the living organism against the microbes, and especially against such as are pathogenic, are subjects on which it is not necessary for me to dwell. What is particularly worthy of note is,—1. Their extraordinary reproductive activity, and the possibility, under favoring conditions, of the anatomical elements being overcome and overwhelmed by them. 2. Certain pathogenic species penetrate the tissues, irritate and give rise to inflammations and morbid growths. 3. Where they find a congenial habitat, they, parasite-like, live at the expense of their host, appropriating oxygen and pabulum, and thus impoverishing the tissues. 4. They secrete or excrete certain poisonous principles,—ptomaïnes, toxines, tox-albumens,—to which the baneful effects of many of them are due.

The habitat of the microbes may be all or any of the tissues and fluids, but ordinarily each pathogenic species has some favorite localization (lungs, intestines, etc.),—some *locus minoris resistentiæ* where it best thrives and multiplies.

Bacteriological therapeutics comprise such medicinal and hygienic means as directly antagonize the bacteria that cause the disease. The term is nearly synonymous with the term *antiseptics*, and is applicable to everything which is prejudicial to the life, multiplication, and functions of the microbe, in doses which are safe for a man to take.* This definition is, as Bouchard points out, a purely medical definition. The surgeon, acting only on limited surfaces, may sacrifice certain parts of the body attacked by the infectious agents. When, however, we come to the practice of general antisepsis, the problem is of a different nature, and this brings me to my second heading.

2. THE LIMITATIONS OF BACTERIOLOGICAL THERAPEUTICS IN INFECTIOUS DISEASES IN GENERAL.

If the views just stated are sound, then an infectious disease may be defined as "a conflict between the subject who is smitten and a particular micro-organism which multiplies at his expense, appropriates his air, water, and pabulum, disintegrates his tissues, or poisons him by its secretions, or by the decompositions which accompany its development." † Granting this definition (to which daily increasing knowledge lends support), the study of bacteria in general, and especially of the pathogenic bacteria, possesses a surpassing interest to every physician who looks for enlightenment and help from the new pathology; for it is not too much to affirm that as the causes of diseases are understood, the triumph of therapeutics becomes more easy of attainment.

It has long been the reproach of the medical profession that therapeutics is not an exact science. With a full knowledge of pathogenic germs and germicides that are available and safe, physicians may eventually feel that the reproach of the ages is no longer justifiable, at least with respect to the microphytic diseases. The art of the physician in presence of these diseases will consist in the observance of a few simple rules: What is the nature of the particular infectious disease, and is the causal agent, the parasite, known? Then all the recognized agents of the parasiticide medication will be called into use to prevent the development and multiplication of the microbe. What can be accomplished by intelligent and watchful prophylaxis to stay the spread of the infection must first be done, and human habitations and persons protected by suitable antiseptic means. In fact, it is from prophylaxis that the first, and, thus far, the principa

* Bouchard. † Duclaux.

services have been realized, and sanitary science, surgery, and obstetrics have derived incalculable benefits from bacteriology, despite the fact that this science is yet in its infancy.

As for the unfortunate victims of microbic invasion, the problem of the therapeutist presents this difficulty: How best to destroy the parasite and not injure the patient? He may not be able to apply his germicides in quite as unstinted a manner to the living human organism as he would to infected barracks or emigrant ships; but this leading indication he will ever have in view,—namely, to render the human environment of the morbiferous microbes as uncomfortable as possible, and to weaken and limit their powers of growth and multiplication. In short, when once the cause is ascertained, there can be but one leading indication,—namely, to destroy the pathogenic agent, or attenuate as far as possible its influence on the economy. The resources of the physician will be enhanced by the practical discoveries of the chemist and microbiologist; and experimental physiology will effect for all rival systems of medication "provings" which cannot be gainsaid, because of their strictly objective character.

Bacteriological therapeutics comprehends such chemical substances as are offensive and destructive to microbes in general, and certain pathogenic microbes in particular. Possibilities in this direction are limited by the ability of the living cells of the organism to tolerate the bactericide agent. This is, and always must be, the principal limitation. It is true that much hope is expressed by some enthusiasts that just as $\frac{1}{150,000}$ of nitrate of silver will destroy a culture of *aspergillus niger*, so for each pathogenic bacterium some specific, harmless or nearly so to the animal cells, while fatal to the parasite, will yet be discovered. I am inclined to believe that such hope will always be like the "purification of our politics," "an iridescent dream."* Nor do we yet know enough about the *modus operandi* and the real value of the immunity obtained by "protective inoculations" (whether of the microbes themselves or the chemical products elaborated by them) to pronounce definitely as to the future of this mode of treatment. I have lately found the farmers of Nebraska full of faith in Dr. Frank Billings's protective inoculations against hog-cholera. Billings inoculates healthy animals with a pure culture of the very microbes that induce the disease, only selecting mild cases from which to obtain the material for his cultures. I have myself (it seems to me) witnessed the triumph of this method of protection.

On the other hand, Pasteur's anthracoid vaccinations have not been a complete success, and always there seems to be an unknown factor of danger, as has repeatedly been illustrated in the mortality which has attended vaccinations against *rouget* and *charbon* in different parts of Europe.

It is not necessary that I should do more than remind this audience of the sanguine expectations and enthusiasm which were lately awakened by Koch's tuberculin, and the miserable disappointment which followed. Nevertheless, I believe that these "bactericide toxines" and "defensive proteids" are destined to play a large part in the therapeutics of the future. They, in fact, come very near to the realization of what therapeutists are looking for, being substances which, elaborated by the microbes, or, as some say, the animal cells, are destructive to the microbes while being inoffensive to the cells of the organism. So that, possibly, our progress in this department of bacteriological therapeutics is limited only by our ignorance.

3. THE LIMITATIONS OF BACTERIOLOGICAL THERAPEUTICS IN RESPECT TO TUBERCULOSIS OF THE LUNGS.

The limitations of bacteriological therapeutics are often due to the fact that the culture soil—the environment, not the microbe—is the principal factor. This is especially the case with tuberculosis. And this naturally introduces the third topic of this paper.

For a time subsequent to Koch's discovery of the bacillary origin of tuberculosis, the special attention of experimental therapeutists was directed to the various antiseptic methods which, one after the other, were vaunted as efficacious against the bacillus. Inhalations took a prominent place: sulphurous acid, creosote, chloroform, carbolic acid, compressed air, ethyl iodide, terebene, eucalyptus, turpentine, benzoin, hydrofluoric acid have all had their advocates and their day. Bergeon's gaseous rectal injections of hydrogen sulphide were given with the same intent; it was believed that the gas which was introduced by the rectum would be eliminated by the pulmonary mucosa, favorably modifying the latter against the bacilli, if not actually destroying the germs *in situ*.

It must be acknowledged that the results of

* Ex-Senator Ingalls.

germicide treatment (and under this title must be included the hot-air-respiration cure of phthisis) have not been what was hoped. As patients sometimes temporarily improve under any kind of treatment, so some consumptives did get better after subjection to the fumes of burning sulphur and after the fluorhydric inhalations; the success of this medication was not, however, sufficiently satisfactory. Certainly laboratory experiments, such as those of Jaccoud, Grancher, and Chantard, have proved that the action of the vapors of fluorhydric acid on the evolution of experimental tuberculosis is *nil.*

The same may, I believe, be said of sulphurous acid vapors in such dilution as can be tolerated.

It is needless to say that there is no medicament yet known which, introduced by the mouth or subcutaneously, can by any direct bactericide power in the least arrest the development of either experimental or spontaneous tuberculosis.

Nor can we hope for much good from the introduction of any microbicide toxine, such as may be found to oppose the development of cultures of the bacillus tuberculosis *in vitro* or arrest the progress of experimental tuberculosis. Phthisis is too predominantly a question of soil (*terrain*) rather than of a specific bacillus. Unlike syphilis, the virus of which is capable of undergoing evolution in any soil, the micro-organism of tuberculosis does not attack all persons, it selects its subjects. "The individual who finds himself in a fairly normal condition of organic equilibrium resists with success, and burns the bacillus when the latter penetrates his air-passages. For this reason tuberculosis is the least contagious of all the microbe diseases. In short, the question of soil is primordial and fundamental; it occupies the first place in prophylaxis and treatment."* And no therapeutist can do good work in combating phthisis who does not start from this datum.

Some (as Cazeaux and Dujardin-Beaumetz) have advised that on all suitable occasions the windows of sleeping-rooms should be left open at night. It has been remarked that a patient will tolerate in a horizontal position, and consequently in bed, temperatures which seem severe when one is sitting or standing. At the same time, physicians cannot be too much cautioned against sending to elevated stations patients with advanced lesions and with fever.

The medical treatment, while not to be neglected, is only of secondary importance; nevertheless, under the use of the classic remedies—cod-liver oil, malt extracts, arsenic, creosote, tannin, hypophosphites, alcohol, cinchona, and nux vomica—one will often witness an augmentation of weight and favorable modifications in the local signs. As adjuvants, inhalations, now no longer relied on as curative, may produce some amelioration. In early phthisis there is much hope in climatotherapy, and this is unfortunately the principal hope.

Such are the principles of treatment which have given me what little success I have ever had, in a practice extending over more than a quarter of a century. Knowing that tuberculosis is simply a *blight* which smites imperfectly-nourished tissues, I would urge that the efforts of the therapeutist be directed to the element of cellular weakness rather than of chasing the will-o'-the-wisp of a bacillus. Evict one hungry brood, and another more voracious and more malignant will take its place.

If it should be argued that all these hygienic means and all medicinal means designed to fortify the organism and save it from the depredations of bacteria are properly *bacteriological*, the reply is that they are only indirectly, not primarily, so.

What would be the result of living in complete isolation from all bacteria (if that were possible) I cannot conjecture, so important are these "infinitely little" organisms in all the phenomena of life, death, and disease.

> "Partout la vie est dans la vie
> Et partout la vie dévore la vie."

Doubtless if the phthisically predisposed could pass their lives in altitudes never invaded by the specific bacillus, many of them might have immunity from tuberculous disease, for the same climate that is fatal to the microbes fortifies the lungs and the constitution. But what shall we say of those who have derived from parental blood the very germs of the disease which remain latent in the organism till the time shall have come when the pulmonary or other tissues, smitten from birth in their vitality, become fit spoil for the parasitic foe? That there are multitudes of such cases which, by the hard conditions of their being, are destined early to succumb; men and women that are weighed

* M. Cazeaux in *Bull. et Mem. de la Soc. de Méd. Pratique*, 1888. I do not know how it can be proved that the individual with well-resistant lungs *burns* the bacillus. It is more in accordance with the present status of science to say that the bacillus is devoured by phagocytes or asphyxiated in uncongenial blood-serum.

down by an hereditary curse which no fortifying environment can ever remove; that the inception of the disease means to them death; that no treatment—hygienic, bactericidal, medicinal—can do much even to ameliorate their condition; that such patients, whether belonging to the higher or lower classes, are and must for generations be the despair of the physician: these are facts of which we are all too painfully cognizant. But this is tantamount to affirming the limitations of all therapeutic means in grave tuberculous disease, owing to a fundamental, irremediable lack of vital resistance and vital endurance.

THE ACTION OF CHLORAL HYDRATE ON THE KIDNEYS.

Since the publication of Liebreich's monograph on chloral there has been no study of the action of this remedy on the kidneys sufficient to explain results which had been sometimes noted to follow the use of this valuable hypnotic. Dr. Cavazzini has, however, recently made some experiments in this connection on dogs and guinea-pigs, and he has found that when injected into the abdominal cavity, chloral hydrate produces marked irritation of the secreting cells of the kidneys. Even after the first injection it causes visible granular degeneration of the epithelium of the convoluted tubules, while after prolonged administration the epithelium of all renal tubules undergo degeneration, with the single exception of the straight tubes.

In more severe cases it produces swelling of all the renal epithelium, with other symptoms of acute parenchymatous nephritis, although the Malpighian glomeruli are never affected, nor is there ever any implication of the interstitial connective tissue.

The intensity of this destructive process depends partly upon the duration of the poisoning, partly also upon the individual's susceptibility. If the remedy is introduced through the stomach, it may likewise produce degenerative changes, but not to as marked a degree or as rapidly as when it is injected into the peritoneal cavity. The lesions thus described of the renal tissue are stated by the author to disappear after suspension of the use of this drug. Nevertheless the author states that in none of the cases in which the post-mortem examination proved this condition to be present, did he ever during life succeed in detecting any albuminuria, a fact which will perhaps explain the great scarcity of clinical observation pointing to the danger of chloral from its action on the kidneys. The author's observations, however, show that the kidneys are liable to marked disorganization from the action of chloral, and should serve to indicate the necessity for great caution in the employment of chloral in cases where the kidneys are already affected.—*Deutsche Medizinal-Zeitung*, September 7, 1891.

BRYONIA ALBA AS A REMEDY.

Dr. Huchard (*Rivista Clinica e Therapeutica*, 1891) calls attention to a very old remedy, which has during our own time escaped attention, namely, bryonia. Bryonia is a member of the Cucurbitaceæ. The part of the plant used is the root, which may attain the size of a man's arm, or even the thigh. The root is fleshy and yellow in color, while its juice is acrid and bitter. In the spring it is full of a white, irritating, and drastic juice. Its active principle is called bryonine. This remedy is one of the most ancient of medicines. Dioscorides praises its purgative and diuretic properties. Boerhaave used the dried root in wine as a cathartic in the treatment of dropsy. Harmand du Montgarny (1783) called it "the true European ipecacuanha," and used it in dysenteric diseases. Bryonia is a hydrogogue purgative which causes profuse watery stools, similar to those of jalap or senna. Too strong doses cause poisoning and a choleriform state. Huchard recommends the remedy as a purgative, 3 grammes (45 grains) of the powder at a dose, this dose producing in a case of hypertrophic cirrhosis with constipation five liquid stools and slight colicky pains; he also recommends it in whooping-cough, febrile diseases and inflammations of the respiratory tracts; in bronchitis, pleurisy, pneumonitis, etc. Bouchet used the tincture in febrile diseases. Dr. Louvet-Lamarre used bryonia in whooping-cough, where it diminishes tracheo-bronchitis, but does not shorten the duration of the disease. The dose is 1 gramme (15 grains) per day for a child of 7 years. During the spasmodic stage Lamarre prescribed the tincture of arosera, 1 gramme (15 drops) per day. Huchard uses a larger dose, 2 to 5 grammes (30 gtt. to 1¼ f3) of the tincture. The two remedies may be associated, 1 to 2 grammes of bryonia tincture to 2 to 5 grammes of arosera. The powder may be given ½ to 4 grammes per day.—*Cincinnati Lancet-Clinic*, September 19, 1891.

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Leading Articles.

THE TREATMENT OF GRANULAR CONJUNCTIVA.

GRANULAR ophthalmia is a disease which has existed from remote antiquity. There is, perhaps, no disease of the eyes more dreaded, both on account of its contagiousness and the gravity of the complications which it entails. There is no ophthalmic affection which has been the subject of so numerous and so varied kinds of treatment. According to Darier,* Hippocrates and his followers understood the importance of the local treatment of the granulations, for, besides the application of various collyria, they practised scraping with coarse cloth or pumice-stone. Cauterizations with the red-hot iron were also in vogue, and this method of treatment is in use among the Arabs to-day. Granular conjunctiva was the Egyptian ophthalmia from which the armies of Napoleon suffered so severely on their return to Europe, and from which so many thousands lost their eyesight.

Of all the innumerable caustics and astringents employed at different times, there are, says Darier, three principal agents which have proved their superiority,—nitrate of silver, as the best modifier of the conjunctival secretion; sulphate of copper, which may be considered as the specific of granulations; and acetate of lead, which is indicated in the slight forms, and in the forms of transition, which rightly or wrongly are called follicular conjunctivitis.† Of these, the sulphate of copper is the most universally used, and the safest. With the manner of applying the bluestone crayon to the everted lids the veriest novice in medicine is familiar. This treatment is not severely painful, and when carried out perseveringly every day for months does certainly cure a considerable percentage of cases. Després prefers the use of a collyrium of the sulphate of copper,‡ especially when the granulations are consecutive to a mild conjunctivitis. His formula is as follows: Sulphate of copper, 1 grain; distilled water, 1 ounce. Such a solution can hardly have aught but an astringent and temporary effect.

Is there a microbe peculiar to trachoma? Schongolowicz says there is, and this microbe is a short bacillus, best stained with gentian violet. He affirms that he has experimentally reproduced the disease in animals by inoculating a pure culture.§ All this lacks verification, as well as the discovery of the trachomococcus by Michel, though he claims experimental results of great interest; nor have Sattler's researches found confirmation. Certainly, however, the contagiousness of trachoma has been established by sufficient facts. It is hardly necessary to call attention to the fact that De Wecker's theory of the action of *jequirity* in this disease is that the latter develops a vegetable ferment on the diseased conjunctivæ, which antagonizes and kills the microbes of the disease, while exciting an inflammation which is destructive of the granulations.

In an interesting paragraph Darier describes the growth and propagation of the granulations, and compares this to the development of miliary tubercles or lupus. Around a mother granulation smaller ones are produced; but this phenomenon is even more apparent when the fibrous envelope is destroyed which covers the old granulations, and their contents are diffused over the con-

* *Bull. Gén. de Thér.*, t. ii., 1891, p. 74.

† *Loc. cit.*

‡ *Chirurgie Journalière*, p. 686.

§ *St. Petersburger Med. Wochenschrift* (cited in *Lancet*, August 23, 1890).

junctival surface or even over the cornea. Then the granulations are seen to spread with great rapidity.

Some caustics, as chromic acid, seem to stimulate the granulations to greater exuberance (this is also known to be the case with epithelioma and lupus), and hence it seems desirable that the treatment should be as radical as possible that complete destruction may be effected of the granulations and the infectious elements which they contain. Hence Peounoff, in the *Moniteur d'Optalmologie* (January and February, 1889), advocates the free use of the curette, which he prefers to any other procedure. He claims to have treated one hundred and eighty cases with success. Antisepsis is adhered to, and bichloride of mercury, 1 to 2000, is used (Maklakoff's "Report").

Professor Panas uses the galvano-cautery.* He first levels the granulations by the cautery laid on flat, and then he dips the needle deeply at different points, in order to reach the underlying strata of granulations.

Quaita has found corrosive sublimate almost a specific. He uses a 1 to 500 solution once daily, applied with a brush, and a 1 to 7000 solution several times a day, applied with cloths.† He finds this treatment well borne even with corneal complications.

Staderini speaks quite highly of this treatment by sublimate, and Luigi is also enthusiastic over it.

C. Bell Taylor believes the diplococcus described by Michel, and found by Schmidt and Sattler, to be the cause of trachoma. He quotes Power as saying,‡ "The diplococcus has its seat inside the trachoma-follicles but outside the cells, not on the surface but in the follicles of the conjunctiva; hence the method of squeezing, cutting, or scratching out the follicles is bacteriologically correct." Taylor thus describes his own treatment: "I scarify the lids, squeeze out the sago grains; occasionally, but not often, excise the retro-tarsal folds, and apply liquor potassæ, sulphate of copper, or syrup of tannin (nitrate of silver as a caustic does not go deep enough), and deal with bad cases by peritomy and inoculation with ophthalmia neonatorum or gonorrhœa (!), or infusion of paternoster bean."§ Cheatham advises "the use of jequirity, having found it unfailingly successful in his practice." Noyes‖ cautions against the use of too powerful caustics, which, indeed, destroy the granulations, but which leave bands of cicatricial tissue in the conjunctiva to act as mechanical irritants. Wicherkiewicz commends a powder composed of 1 part tannin and 3 parts finely triturated boric acid. In severe trachoma the galvano-cautery may precede the powder.

Darier¶ speaks highly of the treatment by corrosive sublimate, which, he says, is "infinitely less painful than the bluestone." He thinks that jequirity and inoculations with blennorrhagic pus have had their day. Of the curette he speaks highly, having found it successful in several cases. The lids are turned back and the granulations scarified with a cataract-needle, then, by means of a fine-cutting curette, all the morbid tissue is scraped off, care being taken to respect the conjunctiva. Anæsthesia by chloroform or ether is necessary to the comfort, if not complete success, of the operation. He now abandons the curette for a simple tooth-brush with short and hard hairs. An indispensable part of the operation is the scarification of the conjunctival envelope of the granulations, according to Sattler's method. By scarification the contents of the granulations are exposed, then, by means of the stiff tooth-brush above mentioned, all the morbid tissue is scraped away. When the tissue is sclerous, the cutting curette is necessary. The lids must be completely everted by means of forcipressure forceps, so as to expose all the granulations, which must be thoroughly scraped away, for, if any are left, the disease will again spread from this centre of infection. Afterwards the bleeding lids are carefully and energetically scrubbed with a solution of sublimate, 1 to 500. The dressing is then applied, which consists, for the first day, of compresses dipped in ice-water. The next day the culs-de-sac are cleared out by means of a probe with a little wadding wound around the point; the wadding is dipped in a sublimate solution, 1 to 500. The following days the lids are turned back as well as possible in order to clear them of the pseudo-membranous coat which lines them. Weak sublimate solutions are used throughout the treatment. Any granulations that may have escaped the brush or curette must be immediately snipped off by a pair of curved scissors.

* *Kansas City Medical Index*, 1888.

† "Sajous's Annual," 1888.

‡ Quoted from "Sajous's Annual."

§ *Bulletin de la Société Anatomique*, 1889.

‖ *Archives of Otology*, 1889 (quoted from "Sajous").

¶ *Bull. Gén de Thérapeutique*, July 30, 1891, p. 77.

The results claimed for this treatment are superior to any which this writer has observed under any other treatment. And whereas it formerly took many months and even years to cure inveterate cases, now, in the majority of cases, a few days suffice to effect a complete cure.

The number of patients successfully treated by Dr. Darier and his colleague, Dr. Abadie, by this method has been sixty.

THE THEORIES OF IMMUNITY.

DR. METCHNIKOFF, of the Pasteur Institute, at the recent meeting of the International Congress of Hygiene and Demography, restated and reaffirmed his views as to the bactericidal power of his phagocytes,—*i.e.*, the leucocytes of the blood. Since the phagocyte theory has been propounded, it has given rise to numerous objections, based on theoretical considerations, as well as on research and experiment; but the more we go into the question, the more it becomes evident that the army of the phagocyte cells is in reality a salutary power which is formed in the struggle of the animal organism for existence. At one time the phagocytes act alone, at another they combine with other factors which facilitate their efficiency. But in all these cases we see these cells combating the parasites. When the phagocytes are inactive, this is a sign either of the harmlessness of the microbe, or, on the contrary, of its extraordinary virulence. Dr. Metchnikoff instanced the case of remittent fever, in which it is known that the spirilla are destroyed by the phagocytes during the crisis and the period of apyrexia. In monkeys, where the spirilla are destroyed by the cells, the illness terminates with the first attack; but in man, where the phagocytes have generally not been able completely to destroy the spirilla, a second attack is produced, in spite of the formation of antitoxine. This is the same in intermittent fever. It is evident that it is only when the microbe is entirely destroyed that the organism can be considered free from it. Therefore, in this act of destruction of the microbes, it is the phagocytes which perform the most important *rôle*, as has been proved in the case of anthrax and in numerous other diseases, and in the case of the vibrio of septicæmia in guinea-pigs.

The question as to the bactericidal power of blood-serum was regarded as complicated and as needing fuller inquiry.

Behring, the founder of the blood-toxic theory, has himself acknowledged that this theory cannot be easily applied, except in diseases like tetanus and diphtheria, which are distinguished by their exceptionally toxic characters and by the absence of diffusion of microbes. As was proved by Vaillart and Vincent in regard to tetanus, the animals which are subject to this malady are naturally refractory to the microbe, and in this immunity from the microbe it is the phagocytes which play the principal part.

At the same meeting, Professor Emmerich read a paper on the "Artificial Production of Immunity against Croupous Pneumonia." He said that immunity was produced by antibacterial toxine being inoculated into the body. The blood of animals made immune possesses not only a very strong bactericidal power, but can be used as a remedy in infectious diseases when injected subcutaneously into the abdominal cavity or into the veins of a diseased animal, as had been proved in dysentery of pigs and in the croupous pneumonia caused by the diplococcus pneumoniæ of Fränkel. Considering that the experiments of Dr. Doenissen have shown that the diplococcus of Fränkel is the cause of the croupous pneumonia, we are entitled to assert that it is possible to cure men of pneumonia by the blood-serum of immunized animals, especially if we succeed in producing this liquid chemically pure and use it in proper quantities.

Dr. Adami said that the bacteriological world was at the present moment divided into two bitterly-opposed camps,—those who held that microbes within the system were destroyed by the agency of the living cells, and those who held that the function of microbic destruction was performed by the blood-serum and body fluids in general. He wished to especially emphasize the fact that we had ample evidence to show that the controversy upon the subject turns after all upon phenomena which differ not so much in kind as in degree. The controversy tended rather to be words than actualities, and if we directed our observations aright, it would be impossible not to be struck by the prevalence of phagocytosis. He was of opinion that those who were not in the thick of the fray must continually accept both views, and would point out that this position was far from being untenable. He said that he need hardly mention that it was especially around the phenomena observed in the rat that this controversy had raged, that in the rat phago-

cytosis could be with difficulty observed, and the rat's blood-serum possessed bacteria-killing properties to a high degree.

In the opening paper, read before the Bacteriological Section on the 12th ult., Dr. Roux, of the Pasteur Institute, said that the theory of immunity proposed by Metchnikoff does not deny that there may be other means of protecting the organism, but it affirms that the phagocytic action is of all these means the most efficacious and extensive. It seems to account for all the facts and to be eminently suggestive; it is thus that the knowledge of microbic poisons and chemical inoculation has thrown light on what would otherwise have been obscure. Far from being shaken by the theories that were opposed to it, this theory of Metchnikoff had gained by the opposition which it had met, and that was a guarantee of its genuineness.

Dr. E. H. Hankin stated his theory of immunity as follows: Immunity, whether natural or acquired, is due to the presence of substances which are formed by the metabolism of the animals rather than by that of the microbe, and which have the power of destroying either the microbe against which immunity is possessed, or the products on which their pathogenic action depends. It may be noted that this theory does not attempt to exclude other factors. He calls the substances on which the bactericidal action depends *defensive proteids*, but concedes that nothing is yet definitely known about them.

THE PHYSICIAN AS SURGEON.

PHYSICIANS practising in the country and general practitioners in large cities often complain of a dearth of surgical cases in their practice. In the country naturally grave accidents are of infrequent occurrence and occasions for major surgery are few. The complaint of the city practitioner is that the best surgical cases go to the hospitals for treatment, and if he is not on the hospital staff he is likely to fare hard for opportunities to exercise his talent and make for himself a reputation as a surgeon. Seeing little of surgery, he perhaps loses interest in that department of his profession, ceases to read in the medical journals the columns devoted especially to surgery, and eventually becomes awkward and unskilful in even the simpler operations in which he may be obliged occasionally to act as principal, such as tying the large arteries for dangerous hemorrhage, reducing a dislocated hip, putting up in splints a fractured thigh or humerus, excising a simple tumor, opening a deep abscess, or reducing a strangulated hernia. He has differentiated into a sort of diagnosticating and drug-prescribing machine, and has acquired a positive disrelish, if not horror, for the scalpel.

The above sketch is no libel on many practitioners otherwise excellent who may be found both in the city and in the country.

That it does not pay for the general practitioner to neglect surgical studies goes without saying. There is in a well-performed surgical operation a satisfaction which does not often attend the administration of powders and pills, and surgical specialists have little reason to complain that their practice is not sufficiently remunerative.

The patient for whom one prescribes may have an incurable malady, little amenable to medical treatment, so that the most careful and painstaking diagnosis and the most judicious advice, based on the leading "indications," may fail to confer much benefit. But the surgeon who removes a tumor that was compromising life, or saves his patient by a lithotomy or laparotomy, performs a service the material benefits of which are plain and indisputable.

How many physicians *medically* treat patients that demand surgical aid: neglecting to apply the curette to the diseased endometrium when months of suffering might thereby be saved, to exsect a necrosed bone which is causing great local and general disturbance, or to strengthen the incurvating spine of a rickety child by a Sayre jacket?

Opportunities for witnessing all kinds of surgery are sufficiently abundant in connection with the large hospitals, and the general practitioner will not fail to derive benefit from frequent attendance on these operations and on the surgical clinics. If this takes him now and then a day from his patients, he will certainly obtain hints that will be of value to him in his private practice. He must, in order to be truly successful, take all medicine for his province (even if he seems now and then to trench on the domain of the specialist), and show as much skill with the scalpel, or in adjusting a splint, as in diagnosticating a spinal sclerosis, or in laying down rules for the administration of mercurials in a syphilitic dermatosis.

PRESCRIPTION-WRITING.

THE day for complicated prescriptions seems to be over. Old physicians well remember the time when prescription-writing was taught as quite an art. Now simplicity seems to be especially cultivated, at least this is true of the practice of the best physicians of the day, and the prescriber is content, it may be, with one "adjuvant" or "corrigent," and almost any convenient "vehicle." The long, often heterogeneous and absurd recipes of a former age are no more heard of, the ingredients of the prescription are few in number, and "direct medication" is attempted.

Pharmacists in many places complain that there is not so much call for the old-fashioned tinctures and fluid extracts of the Pharmacopœia as formerly, and that the tablet triturate with its single drug and definite dose is usurping the place of the classic preparations. This is not the place to discuss whether this is an improvement or an evil.

Legibility in prescription-writing is just as much a desideratum as ever. The melancholy accident will not soon be forgotten (it occurred in Paris about two years ago), where a medical man wrote for one gramme of antipyrin; the chirography was so execrable that the word *antipyrin* was mistaken by the druggist for *atropine*, and a gramme of the latter was administered, with resulting death of the patient. There can be no excuse for the slovenly manner in which some physicians write their prescriptions.

Shall the physician write his own formulæ, or shall he depend on the formulæ of his textbooks or the medical journal he takes? We think that, as a rule, he will do better to devise his own formulæ, which should be the result of an intelligent study of each individual case, and a careful adaptation of the drugs to the patient, with the intent to obtain a definite therapeutic effect. He who borrows all his formulæ is likely to prove a careless and inefficient practitioner.

A NEW VOLATILE ANTISEPTIC.

IN the *Internationale Klinische Rundschau* for September 6, 1891, Dr. A. Passerini writes that some months ago he began the treatment of affections of the bronchi and lungs through inhalations of trichlorophenol, which, as is well known, is an active antiseptic, but, on account of its extremely unpleasant odor and highly-irritating qualities he was compelled to suspend his experiments. Recently, however, he states that Dr. Tacchini has succeeded in preparing a pure preparation, which he terms chlorophenol, and which is quite as antiseptic as the trichlorophenol, and yet free from the disadvantages of the latter. This new remedy is stated to have no unpleasant odor, is not irritating, is a highly volatile liquid, and its vapor is heavier than air. Dr. Passerini first satisfied himself of its activity as a local application to wounds, sluggish ulcers, and suppurating lymphatic glands, and then employed it in several cases of ozæna, laryngitis, chronic bronchial catarrh, and especially in cases of pulmonary tuberculosis. The author maintained that the great volatility of this new antiseptic and the fact that its vapor is heavier than air leads to the rapid distribution of the fumes in the bronchi, and that they extend down through the finest bronchi and even to the alveoli, where they are capable of exerting a direct beneficial action.

Dr. Passerini promises shortly to publish a full account of this remedy, especially as regards its composition, physical and chemical attributes, and modes of application, but he now calls attention to the remedy with the idea that the experiments may be carried on by others. He now states that inhalations of chlorophenol are well supported, even by patients in the last stages of tuberculosis; that their employment is entirely free from any disadvantage, even when persisted in for a long time, and that they invariably, as far as his experience extended, lead to favorable results, which are evidenced by the reduced amount of expectoration, sometimes to its entire suppression, to the disappearance of bacilli, improvement or disappearance of cough, disappearance of fever, return of appetite, increase in the body-weight, and, in fact, general improvement.

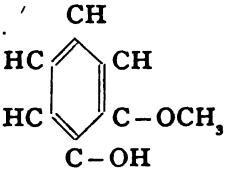
The author claims that he has now treated five cases of incipient pulmonary tuberculosis, and as far as six months' observation will permit, he believes that they are entirely cured.

Reports on Therapeutic Progress.

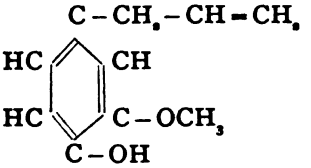
BENZOYL AND CINNAMYL EUGENOL.

It is reported that, in the search for remedies for tuberculosis, experiments are now being made with the benzoyl and cinnamyl esters of eugenol (*Pharm. Centralb.*, June 25, p. 365). It will be remembered that oil of cloves has

already been recommended in the treatment of tuberculous affections, and DR. KOCH has suggested the internal administration of eugenol, its chief constituent, to patients undergoing the tuberculin treatment. Probably the use of the eugenol esters has been suggested by the introduction of the corresponding esters of guaiacol under the names "benzosol" and "styracol." The relation will be seen if eugenol be represented as guaiacol (the methyl ether of pyrocatechin), in which an atom of hydrogen in the para position to the hydroxyl group is replaced by an allyl group.

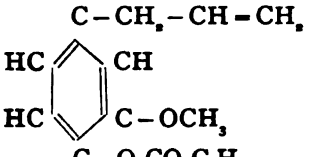


Guaiacol.

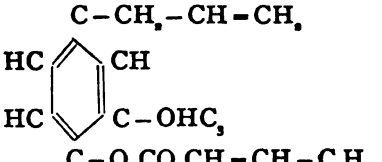


Eugenol.

The benzoyl and cinnamyl ethers of eugenol might then be represented by the formulæ—



Benzeugenol.



Cinnamyl-eugenol.

Benzeugenol is described as crystallizing in colorless and odorless needles, having a weak bitter taste, being neutral in reaction and melting at 70.5° C. It is almost insoluble in water, and freely soluble in hot alcohol, chloroform, ether, and acetone. With concentrated sulphuric acid it gives the purple-red color characteristic of eugenol, this reaction distinguishing it from benzosol, which gives only a pale-yellow color. Cinnamyl-eugenol forms shining needles, which are colorless, odorless, and tasteless, neutral in reaction, and melt at 90° to 91°. It is scarcely soluble in water, but freely in hot alcohol, chloroform, ether, and acetone. With concentrated sulphuric acid it gives a purple-red color, like benzeugenol, but it may be distinguished by the different melting-point. Both compounds are readily saponified with alcoholic potash. —*Pharmaceutical Journal and Transactions*, August 1, 1891.

NEW TREATMENT OF DIPHTHERIA.

The highly unsatisfactory state of the therapeutics of this terrible destroyer of infantile life is assuredly in nowise better shown than by the amount of literature constantly devoted to the subject, and the number of systems of treatment continually being proposed. Pretty nearly every drug in and out of the Pharmacopœia has had its advocates, and still the sheaves are garnered, and the edge of the sickle has not been turned by drugs and systems.

PROFESSOR SEIBERT proposes (*Archives of Pediatrics*, June, 1891) yet another system of treatment of pharyngeal diphtheria, which is interesting from some points of view. Basing his ideas upon the fact that the pharyngeal manifestations of diphtheria begin as a local process, and that this owes origin to the entry and penetration in the mucous membrane of the Klebs-Loeffler bacillus; that the pseudo-membrane is not the disease, but the result of the disease, and is "a safe guide to the diphtheritic inflammation below it;" that the chief treatment should be local, and that the removal of pseudo-membranes is useless, as the bacilli contained therein are of no further consequence, and that local treatment, as carried out generally, does not reach the *active* bacilli in the lower strata of inflamed tissue, and is therefore neither local nor germicidal; that wiping away the pseudo-membranes and applying strong antiseptics to the parts is also ineffective, as only tending to cauterize and infect the healthy surrounding mucosa, to rubbing the bacilli into deeper parts, and is without germicidal effect, Professor Seibert has devised instruments for the purpose of bringing comparatively small, but very strong, solutions into *direct* contact with the bacteria which are in activity upon the lower stratum of the mucosa. The antibacillary medium to be used is the officinal and freshly-prepared chlorine-water of the United States Pharmacopœia, and with a special syringe (the chief feature of which appears to be that instead of one needle-point there are five such points arranged on

a flat disk) the points are pressed firmly in to their full length into the pseudo-membrane, so as to reach the inflamed tissue below, and chlorine-water is injected into the part. Thus brought into direct contact with the active bacilli and cocci of diphtheria, these latter are immediately destroyed, and "the process comes to a stand-still." The contact of the chlorine and the active germs is the foundation of the treatment.

After the injection a gargle of one or two grammes of tincture of iodine, and ten drops of concentrated carbolic acid, in four ounces of water, is given, a teaspoonful being alternately gargled and swallowed every fifteen minutes, from 6 A.M. to 12 at night; five drops for gargling, and half a teaspoonful every half-hour for swallowing, being given to younger children. Zinc and mercurial ointment is rubbed into the swollen glands every two or three hours or less, and an ice-bag adjusted over the swollen parts of the neck. It is claimed that where the process is localized, and the membranes are undermined by the chlorine injections, the temperature makes three to four degrees, and the œdematous swelling disappears. Though the pseudo-membranes remain in the throat for two to four days, they are harmless, but the mouth-wash keeps them from spreading the process. Of thirty-five cases, Dr. Seibert claims to have only lost two under this method of treatment, and none of his patients developed diphtheritic paralysis. If we could be sure that the arguments in favor of the treatment were not of the *post hoc, propter hoc* kind, we might be tempted to echo the author's remarks, that "these cases are sufficient to show that the chlorine-water injections are 'efficient, local, and germicidal' enough to check the career of any diphtheria germs they come in contact with." At all events, the results are good, the treatment novel, and, in view of the disappointing nature of most plans of treatment of diphtheria, we cannot afford to disregard any suggestion, based upon respectable data, for contending with this formidable disorder.—*Journal of Laryngology and Rhinology*, August, 1891.

THE HYPNOTIC ACTION OF THE ANTIPYRETICS.

In the *Deutsche Medizinal Zeitung* for June 5, 1891, PROFESSOR BERNHEIM calls attention to the great similarity in action of the so-called antipyretics,—quinine, salicylic acid, antipyrin, antifebrin, phenacetin, etc.,—not only in their antithermic, but also in their hypnotic action. When the favorable action of salicylic acid in rheumatism was first observed it was designated as a specific for this affection, but experience has taught that the other antithermic remedies produce a favorable effect likewise in the same manner,—that is, they diminish articular pain without influencing the course of morbid processes itself. According to Bernheim, the connection between antithermic and analgesic action is the following: Fever originates through the absorption into the blood of pyrogenic substances, which act as stimulants to the heat-centres, and reduction of temperature can be produced by the elimination of these pyrogenic substances or by direct action on the heat-centre. If the antithermics were capable of actually destroying the ferments in the blood they would then act as abortive agents. This is, however, not the case, according to Bernheim, who will not even admit a specific action for quinine in the case of malaria, since he maintains that the action of this substance on the disease is merely due to its antithermic properties, which are possessed in almost equal degree by the other antithermics. He concludes that the different antipyretics, quinine and salicylic acid included, only produce their action either through antithermic influence on the cerebral centre, and that through antipyretic action within the organism has never been demonstrated. He likewise maintains that the analgesic action is in close connection with the antithermic action, and likewise is produced by influence of nerve-centres, which are probably included in the gray substance of the cortex. In fact, Bernheim states that by the æsthesiometer he has succeeded in producing marked reduction in the sensibility of the skin after the exhibition of quinine. According to this, therefore, the antipyretics are only indicated in fevers in the height of temperature or when they are to be employed for the reduction of abnormally increased sensibility.

THE USE OF MORPHINE FOR THE RELIEF OF CERTAIN URÆMIC SYMPTOMS.

In the *Medical News* for July 11, 1891, DR. H. W. WASHBURN maintains that there are certain uræmic symptoms — convulsions, renal asthma, and severe cephalalgia—for the relief of which morphine is specially indicated. He believes that it relieves distressing symptoms, without adding to the dangers under which the

patient already labors, and thus gives the physician an opportunity to resort to other well-known methods of treatment,—namely: 1, to reduce the supply of poisonous substances in the blood by regulating the diet, by bowel disinfection, and by attention to the functions of the liver; 2, the removal of uræmic poisons by venesection, purgation, or diaphoresis; 3, their oxidation by the use of oxygen or active exercise; 4, the relief of particular symptoms or antagonizing the poisons.

Headache, drowsiness, coma, dyspnœa, vomiting, diarrhœa, disturbances of sight and hearing, muscular twitchings and convulsions are the symptoms which appear, in varying combinations, in that condition to which the term uræmia is applied. These symptoms are the result of the retention in the blood of certain excrementitious substances which the kidneys, in the course of Bright's disease, acute or chronic, have been unable to eliminate. They are an expression of the deleterious effects of these poisonous substances upon the brain and nervous system. That these symptoms are not the result of the retention in the blood of urea has long been known, although under that supposition the term uræmia was applied to them.

The symptoms being thus various and diverse, it seems reasonable to conclude, and experiment has proved, that they are not the effect of any one or two toxic substances, although it is not possible to determine positively what particular symptom is caused by a given excrementitious substance.

In a given case the symptoms observed will, therefore, vary as the proportions of these different toxic substances in the blood vary. In one case vomiting and diarrhœa may be the prominent symptoms; in another headache, asthmatic attacks, or convulsions; in still another, delirium, tinnitus aurium, hemiplegia, coma.

In uræmic poisoning, when convulsions, cephalalgia, or renal asthma constitute the predominant symptoms, we have, with the first two, spasm of the arterioles of the cerebral cortex; in the last, spasm of the pulmonary arterioles, and, at the same time, rapid and ordinarily feeble pulse, low blood-pressure, dilated pupils, and diminished secretion of urine. In the case of renal asthma there is, as stated, spasm of the pulmonary arterioles; as a result of the consequent dyspnœa there is imperfect aeration of the blood; the abnormal blood, acting upon the vaso-motor centres, and also upon the blood-vessels themselves, causes general arterial constriction and constriction of the renal vessels (as is shown by the actual reduction in the size of the kidney), and hence diminution in the urinary flow. The quantity of urine secreted in a given time is directly dependent upon the blood-pressure; and hence the amount of urine will be increased by any condition that increases the general blood-pressure, unless there is at the same time constriction of the renal arteries. The objects, then, to be accomplished under such conditions as these are: To relax the spasm of the arterioles of the lung and of the cerebral cortex; to diminish nervous sensibility, both sensory and motor; to increase the general blood-pressure while relieving the constriction of the vessels in the kidneys, thus increasing the urinary secretion. Have we a drug in the materia medica the exhibition of which can reasonably be expected to fulfil these various indications?

In considering the physiological effects of morphine, in full therapeutic doses, it will only be necessary to inquire into its effects upon the nervous and circulatory systems and upon the action of the kidneys. Its effects upon the nervous system are to lessen sensibility, both sensory and motor, thus relieving pain and relaxing spasm. Acting upon the circulatory system, it at first produces temporary acceleration of the pulse-rate, soon followed by slowing and increased fulness and force as a result of the action of the drug upon the inhibitory cardiac nerves. The blood-pressure is thus increased. There is no unanimity of opinion as to its action upon the kidneys, some authors affirming that it increases the flow of urine, and others that it diminishes the flow. At all events, it is perfectly clear that it sometimes does increase the amount of urine, and that it must do so by its action upon the blood-pressure and by the relief of local arterial constriction. When retention of urine follows the use of morphine, it results from the blunted sensibility of the bladder. Morphine increases the excretion of urea in man and contracts the pupil.

We thus have *à priori* the clearest and strongest possible grounds for administering morphine for the relief of the conditions named,—convulsions, real asthma, cephalalgia. The indications sought to be fulfilled—relief of spasm, alleviation of pain, increase of blood-pressure, and hence increase in amount of urine—are exactly met by the known physiological effects of the drug. At this time, however, we are fortunately not limited to *à priori* reasons for anticipating favorable results from the use of this drug; there are abundant facts *à posteriori*

to substantiate the validity of the deduction that, the conditions indicated being present, neither in acute nor in chronic uræmic intoxication will morphine add to the dangers already existing, but that it will uniformly produce happy results.

TREATMENT OF BRONCHO-PNEUMONIA IN CHILDREN BY SUBCUTANEOUS INJECTIONS OF THE HYDROCHLORATE OF QUININE.

In the *Journal de Mêdecine de Paris*, June 21, 1891, Dr. St.-Philippe calls attention to the difficulty in diagnosis between pneumonia complicated with enteritis and typhoid fever, while from the point of view of treatment he points out that there are two features which are valuable indications as to the methods to be pursued. First, as to the degree of bronchitis; and, second, as to the extent of the pulmonary lesion, for the congestive process may be so sudden and extensive as to produce death in a few hours. Against this latter form of danger Dr. St.-Philippe maintains that there is no drug which can equal quinine, whether administered by the mouth, the rectum, or under the skin. Sulphate of quinine he gives in black coffee, while in very small children or those who refuse to take medicine it may be employed in enemata or in powders; but both these modes of medication are slow in action, and for entire reliability he usually recommends the employment of quinine in subcutaneous injections, making use of a solution of chlorhydrate of quinine and equal parts of glycerin and water. Quinine thus forms his main reliance in the treatment of broncho-pneumonia, to which may be added blisters, which he even allows to pass on to suppuration over the localities where râles are most abundant. In suffocative catarrh he has recourse to mustard plasters, large blisters or leeches, according to the age of the child; while in some cases he employs tincture of aconite root in doses of 5 to 20 drops in twenty-four hours, and in syrup of aconite in cases where the bronchitis is intense, while quinine and punch are given when the general state is at all depressed. In states of excitement he does not advise the use of opium, but warm baths and small doses of antipyrin. In severe cases, quinine and aconite are to be abandoned and caffeine given subcutaneously, and reliance placed upon digitalis and alcohol as stimulants. He likewise states that oxygen inhalations have given better results than injections of ether.

A NEW TREATMENT FOR CORYZA.

Through the action of carbonic acid under high temperature and pressure on alpha-sodium naphthol an acid bearing the name of alpha-oxynaphthœic acid occurs in the form of white odorless crystals, with a sharp taste, and which are claimed to possess five times the antiseptic energy of salicylic acid. According to the *Pharmaceutische Post* for July 19, 1891, this remedy has been employed with great success in the treatment of nasal catarrh. Fifteen grains of the powder are warmed, and the fumes are then to be inhaled. At first the catarrh becomes markedly increased from the irritating effects of the remedy, but after a few hours undergoes rapid improvement. Ordinarily it is claimed that one employment of this remedy is sufficient.

FATTY DEGENERATION OF THE HEART IN DIPHTHERIA.

During a recent epidemic of diphtheria in Göttingen many persons died, and Schlem gives, in the *Archiv für Pathologische Anatomie und Physiologie und für Klinische Medicin*, an account of his examination of the muscular tissue of the heart in the fatal cases. His observations were not confined to those cases that were accompanied with cardiac symptoms, but embraced all the fatal cases that occurred during the time that his research was in progress; thirteen cases in all were the basis of this study. This systematic method of inquiry afforded the writer of the paper an unusual opportunity of estimating the frequency with which the heart is attacked in diphtheria, as well as the nature and extent of the attack. The pathological changes noted were the following: Fatty and granular degeneration of the muscular fibres, slight hyaline degeneration and atrophy, and, in a few cases, extravasations of blood in the form of dots. The connective tissue frequently appeared somewhat rich in cells. Fatty degeneration and granular degeneration were found in every case, although they were very slight in some of them, especially when the false membrane had been the cause of death; in others the degeneration was extreme, so that some fibres seemed to be entirely replaced by fat-cells, affording an explanation of the cardiac enfeeblement noted in those cases, or most of them, during life. Age appeared to have no special relation to this cardiac degeneration, but the duration of the attack seemed to have exerted a marked influence. In cases that exhibited the most extreme morbid changes the disease had lasted from ten

to eighteen days; in other instances, where the fatal event had come earlier, the changes were less extensive, while in cases where the larynx was involved and the patient had succumbed in the early stage of the disease, the least amount of morbid alteration was discovered. The changes in the muscular tissue of the heart seemed to have no influence over pulmonary complications. In several cases in which broncho-pneumonia was present there was little disease of the heart, while in others there was no pneumonia, but extensive cardiac degeneration. In one case proliferation of nuclei was observed in the intermuscular connective tissue, and this lay in close proximity to the pericardium at a point where that structure was undergoing a like change. In several instances the writer found the intermuscular and circumvascular connective tissue infiltrated with nuclei to some extent, but he was not able to determine whether or not this was a normal phenomenon in children. As to the causative influence of fever over fatty substitution, he expresses the conviction that it is not the cause, since in many cases the bodily heat had been moderate or not above the normal point. The pathology of the changes in the heart during diphtheria is analogous to the condition described by Orth as parenchymatous or degenerative myocarditis, which is a frequent result in other severe diseases of an infectious nature.—*New York Medical Journal*, July 4, 1891.

SUBCUTANEOUS INJECTIONS OF IRON.

DR. ROSENTHAL has made an interesting study of the action of subcutaneous injections of iron in nervous affections. By personal experiment he ascertained that when a preparation of iron was administered subcutaneously, it was absorbed thirty to forty minutes after injection, and could be detected in the urine. From the basis of a long series of investigations the author recommends two iron preparations for hypodermic injection. One is the so-called ferrum peptonatum, obtained by the decomposition of ferric chloride solution with solution of pepsin, as a brownish-yellow powder, readily soluble in water. It is applied in aqueous solution (1 to 10), one syringeful being given every second day. The second suitable preparation is ferrum oleatum diluted to 1 to 20 by olive oil, and used similarly. Of the two, the former is preferable, on account of its greater solubility and stability. The subcutaneous iron treatment is recommended by Rosenthal in delicate neurasthenic persons and in the asthenic dyspepsia so often associated with anæmia, in which small doses of iron may produce considerable digestive disturbance. Unpleasant by-effects did not appear.—*Provincial Medical Journal*, September 1, 1891.

PHENOCOLL HYDROCHLORATE.

In *Notes on New Remedies* for August, 1891, DR. ISAAC OTT publishes the following summary of his experiments made with hydrochlorate of phenocoll.

Upon frogs it produces a general paralysis, due to an action upon the cerebro-spinal axis.

Upon rabbits it produces a cyanotic condition of the ears, and reduces the force and frequency of the heart.

It kills through an action upon the centre of respiration.

Upon the vascular tension the tendency is to diminish it.

Upon the temperature its action is one of reduction.

Its effect upon the temperature seems to be of short duration.

These experimental facts explain its utility in rheumatic pains and pyrexia.

It is evidently a drug of considerable power and rapid in its activity. This drug seems to be worthy of a fair trial at the hands of the profession.

GONORRHŒAL SALPINGITIS.

TERRILON (*Gazette de Gynecologie*), in a valuable contribution upon this subject, in speaking of the treatment, says that the curette can only modify the uterine mucous membrane, which is at the same time affected, and in this way may relieve the patient somewhat, but the tube remains in the same state. The medical treatment is symptomatic. He regards rest in bed as an important measure; next to this he values vaginal irrigation. The patient is placed in position as for examination with the speculum, and a certain quantity of warm water is injected, and, as soon as the patient complains of too much heat, the flow is arrested by obstructing the vulvar orifice. After several minutes the water is allowed to flow out, and the process is repeated. This is continued for a long time. He has had good effects from blistering the abdomen with blisters or the hot iron. Constipation is to be relieved by repeated purgation, and pelvic peritonitis is treated by absolute repose, cataplasms, revul-

sives, and leeches. Such measures, he says, can ameliorate very much the condition of the patient and even bring about the semblance of a cure, but we cannot be sure that the patient will not have a relapse, even after a very long period of absolute freedom.—*Archives of Gynæcology*, August, 1891.

INFLUENCE OF ANTIPYRIN ON THE SECRETION OF MILK.

Dr. Guibert writes in the *Lyon Médical* for August 9, 1891, that antipyrin renders marked service in cases where it is necessary to arrest the secretion of milk from newly-delivered females, provided the kidneys be normal. He states that generally it suffices to administer thirty grains of antipyrin daily for two days, in order to obtain the desired effect. He gives the remedy in capsules of 4 grains each, one to be taken every two hours.

A NEW TREATMENT OF GRANULAR CONJUNCTIVITIS.

The usual treatment of granular conjunctivitis consists in turning back the eyelids with the fingers, and then cauterizing the portion of the conjunctiva thus exposed with the sulphate of copper. This daily cauterization is extremely painful, and does not produce cure until after many weeks of severe suffering, and sometimes did not prevent absolute blindness.

At the meeting of the Académie de Médecine, held on August 4, 1891, Dr. Abadie described a method in the first place of completely everting the upper eyelid so as to expose the superior conjunctival cul-de-sac (*La France Médicale*, August 7, 1891). In the ordinary method of procedure it is this part of the superior cul-de-sac which is never exposed, and which is ordinarily a veritable focus of infection. To accomplish this complete inversion of the eyelids special instruments are necessary, and the patient must be chloroformed on account of the severe pain produced by this manœuvre. The eyelid is seized with forceps, and then rolled twice upon itself, or, in other words, rolled twice completely around the forceps, so as to completely expose the superior conjunctival cul-de-sac, which is then scarified freely with a bistoury, and a fairly hard tooth-brush is then dipped in a solution of corrosive sublimate, 1 to 500, and the raw surface vigorously brushed with this solution. This procedure is only required once, and then on subsequent days the eyelids are simply everted in the ordinary manner and the conjunctiva bathed with a solution of sublimate. The author states that this method of treatment may be applied to all cases, no matter what may be the existing degree of complication, and that its efficiency is the more marked the more serious is the case.

Dr. Guaita recommended first the use of sublimate in strong doses, Sattler insisted upon the efficiency of scarifications combined with scraping of the granular tissues, while Manolescu suggested the use of the brush; but the value of the procedure depends upon the employment together of all these procedures, which individually are inefficacious, and upon the complete exposure of the superior cul-de-sac.

THE INFLUENCE OF ENEMATA AND CERTAIN REMEDIES ON THE COMPOSITION AND QUANTITY OF THE BILE.

Dr. A. Leventon (*Les Nouveaux Remèdes*, August 8, 1891) has experimented on a dog with a permanent biliary fistula. He has determined that enemata of warm or cold water have no action on the quantity or composition of the bile.

Gamboge in small doses causes inactivity. In large doses it diminishes the quantity of the bile. In the absence of bile from the intestinal tract the purgative action of gamboge is reduced.

Jalap, or its active constituent, jalapin or convolvulin, are without influence on the bile. Jalap and convolvulin lose their purgative power when the bile is absent from the intestine. This is not the case with aloes and aloin or jalapin.

Aloes and aloin are not to be considered as cholagogues. This also applies, according to the author, to podophyllotoxin.

A NEW MODE OF ADMINISTERING THE BROMIDES.

The *Pharmaceutical Record* remarks that in Paris the pharmacists have of late been astonished by the increasing number of prescriptions they have been called upon to dispense wherein the bromides are combined with naphthol and bismuth. This new departure is simply the practical carrying out of some suggestions made last year by Professor Féré, of the Salpêtrière, that large doses of the bromides tended, in certain individuals, to beget unpleasant symptoms chiefly for the reason that the gastro-intestinal tract

of such persons was in a condition of sepsis that prevented the proper assimilation of the drug. He recommended the administration of such intestinal antiseptics as naphthol and salicylate of bismuth as a means of removing drug intolerance from this and from other causes. The following formula is one method found by him to be advantageous, in the treatment of epileptics especially:

℞ Potassium bromide, ʒiss;
Beta-naphthol, ʒi;
Salicylate of sodium, ʒss. M.

Sig.—Divide into three doses, one dose to be given three times daily.

It is maintained by Féré that this treatment is curative as well as preventive. He has found that the eczema and psoriasis which sometimes follow in the train of borax will also disappear if the intestinal tract is rendered aseptic. To the formula above given some Paris physicians are in the habit of adding one-thirtieth of a grain of sulphate of strychnine.—*New York Medical Journal*, September 5, 1891.

THE ACTIVE PRINCIPLE OF WOOD ANEMONE.

Dr. Dupuy, in *Les Nouveaux Remèdes*, July 8, 1891, has extracted, in the form of crystalline needles, a substance from the wood anemone which seems to possess extremely energetic action on the economy. In large doses its toxicity is very marked, producing trembling, hebetude, and sanguinolent diarrhœa, and death from paralysis. From the therapeutic point of view, this drug, which he calls "anemonine," is said to act with great efficiency in catarrh and chronic bronchitis, and especially as a calmative of convulsive cough and in whooping-cough. It is also said to possess emmenagogic properties.

NEW REMEDIES IN WHOOPING-COUGH.

Von Genser was the first to prescribe the use of antipyrin in the treatment of whooping-cough. His cases amounted to one hundred and twenty in number, and he stated that under its administration he found that the duration of the disease was reduced as a rule to twenty-four days, instead of its usual length of sixty to ninety days. He employed it in doses of 1½ grains to children of 3 or 4 years of age.

Dr. Sonnenberger has used it in seventy cases, giving to very young children ½ to 1½ grains four times daily. He likewise claims considerable improvement in the severity of the attacks and marked reduction in the duration of the disease. Nevertheless the administration of antipyrin is not absolutely harmless, and cases of poisoning from this substance are not rare. Thus, Dr. Rothe claims that he has seen numerous unfavorable results following the use of antipyrin, and that he now makes use of a combination of tincture of iodine and carbolic acid, which he recommends in the strongest terms in the treatment of whooping-cough. He writes that in one hundred cases occurring in his own practice, in which there was no possibility of error in diagnosis, the maximum duration of the disease was four weeks. He makes use of a solution containing carbolic acid and alcohol, each 1½ grains; tincture of iodine, 10 drops; tincture of belladonna, 30 drops; mint-water, 2 ounces; of which a teaspoonful may be given every hour to a child 2 years of age. Antipyrin has also been employed with advantage as a sedative and antispasmodic in whooping-cough. Dr. Love has published fifty cases treated in this manner with satisfactory results. Dr. How has likewise employed acetanilide with success, the dose given four times daily, varying with the age of the child, from ½ to 5 grains. Dr. Heiman also recommends the use of phenacetin in whooping-cough, and he mentions a case treated with good results with phenacetin when antipyrin had been without effect. He administers 1½ grains four times daily to a child 3 years of age. We have also before alluded to the employment by Moncorvo of resorcin in whooping-cough, and his method has been followed out by Bouchut, Callais, and Mauriac, who claim that they have been satisfied with the results obtained. On the other hand, Mugdan writes that in eight cases he employed resorcin, and in all without effect.

In conclusion, we may call attention to the fact that sulphurous acid has been employed by Mauby, bromoform by Stepp, Löwenthal, and Neumann, chloroform-water by Stepp and Shilling, hydrate of terpin by Manasse, while finally ouabaine has been recommended by English physicians.—*La Pratique Médicale*, June 23, 1891.

PANCREATIC DIGESTION OF FATS.

Last week we referred to the work of Gad and Rachford on the formation of spontaneous emulsions. They found that if a drop of oil containing five and a half per cent. of fatty acid was dropped upon a one-fourth per

cent. sodium carbonate solution, a spontaneous emulsion was formed. Using this method in the investigation of the pancreatic digestion of fats, Rachford discovered some very interesting and valuable facts. Discouraged by Heidenhain's attempts to make permanent pancreatic fistulæ in dogs, he made use of temporary fistulæ in rabbits, in this way always securing fresh juice for his experiments. The portion of the duodenum containing the end of the pancreatic duct was resected, brought to the surface of the abdomen, and the pure juice obtained through a glass canula inserted into the open end of the duct. Taking the pancreatic juice so obtained, it was shaken up with neutral olive oil for a moment, and then the two allowed to separate. A drop from the supernatant oil was then pipetted off and dropped upon a one-fourth per cent. solution of sodium carbonate. This operation was repeated every three minutes until a perfect spontaneous emulsion was formed. As an average of his experiments, he found that about twenty minutes were required to form the perfect emulsion under these circumstances; or, in other words, the juice would produce five and a half per cent. of fatty acid in the oil in twenty minutes. These experiments were conducted at the ordinary temperature of the room, 18° C. (64.4° F.). When the mixture of the oil and juice was kept at the temperature of the body, the fat-splitting activity of the juice was doubled, and the five and a half per cent. of fatty acid was formed in about ten minutes. The emulsions formed in this way had all the peculiarities of the emulsions formed with neutral oil, to which a definite amount of fatty acid had been added, and sodium carbonate solution, to which we referred last week. The most important feature of his experiments, perhaps, was his determination of the influence which the other digestive agents had upon the fat-splitting properties of the pancreatic juice. Representing the activity of the juice at room temperature by 20, the addition of dilute hydrochloric acid was found to reduce this activity to 13, while the addition of the principal constituent of the bile—viz., the glycocholate of soda—increased it to 44. When the glycocholate of soda and hydrochloric acid were both added, the activity was still further increased, being represented by 56. That the other ingredients of the bile were not unimportant in this connection was shown by the fact that the juice and bile alone had an activity of 64. The greatest effect, however, was obtained by a mixture of pancreatic juice, bile, and hydrochloric acid, the activity of the mixture being 80, or four times that of the pancreatic juice alone.

Rachford's experiments show very clearly that the bile does not assist in the emulsification of fats, as has been so long taught, but, on the contrary, directly interferes with the emulsification, while it does assist powerfully in decomposing the fats into glycerin and fatty acids.

It has been the custom of late to study the digestive ferments separately, in order to obtain so-called accurate information, but these experiments certainly indicate that the combined action of these ferments may give strikingly different results from what their separate actions would indicate.—*Journal of the American Medical Association*, August 22, 1891.

INJECTIONS OF NITROGLYCERIN FOR POISONING BY ILLUMINATING GAS.

In the *Repertoire de Pharmacie* for August 10, 1891, reference is made to a case reported by Dr. Hoffmann of an actress to whom the author was summoned, and in whom he found the face pale, the extremities cold, foam on the mouth, pulse filiform and intermittent, respiration superficial and slow, and the cornea insensitive. It was determined that inhalation of illuminating gas was the cause of this serious condition, and, injections of ether producing no improvement, Dr. Hoffmann injected $\frac{1}{64}$ grain of nitroglycerine into the præcordial region, whereupon prompt improvement took place, and the patient recovered.

THE APPLICATION OF HOT-AIR-TAR BATHS IN THE TREATMENT OF RHEUMATISM.

Dr. Paul Chevandier has written an interesting thesis on this subject, from which we extract the following: Hot-air baths were first used in Oriental countries, and introduced into Europe by the Moors. It appears that the natives of Mexico, at the time of the discovery of America, also employed heated air saturated with aromatic vapors in the treatment of rheumatic pains. The aborigines dug a hole in the ground large enough for a man to lie in, and over this built a sort of dome of stones and clay, the whole structure looking somewhat like a baker's oven. The bottom was covered with aromatic shrubs, on which the sick man lay.

In France ovens in which resinoid matters were burned were employed in early times for the treatment of rheumatism. Later the oven was replaced by a "fumigation chamber." In the latter a fire was built, which heats the air and impregnates it with resinous vapors, which are conducted to several chambers communicating with the furnace.

According to M. Chevandier, there is little or no analogy between the physiological effects of dry thermo-resinous vapors and those of ordinary steam vapor baths. The former produces redness, congestion, and tension of the skin, the latter soften and relax it. The diaphoresis produced by the former results from the increased activity of the sudoriparous glands, while the sweating from the latter is due simply to a passive exudation. In dry-air baths one can readily endure a temperature of 70° to 80° C., while in the ordinary steam bath a temperature of 50° C. is very uncomfortable, and 55° C. causes a burning sensation.

In hot-air-tar baths of a temperature of 60° C. the patients perspire freely and absorb large amounts of oleo-resinous vapors, as is shown by the strong odor of violets emitted by the urine. A short time after the bath the perspiration becomes so abundant that some patients lose as much as a thousand grammes of bodily weight within half an hour. A miliary eruption may be developed, but this will disappear spontaneously within twenty-four hours. Headache is observed in rare instances, but yields readily to the application of cold to the head. The digestive functions are stimulated. Some nervous excitement, insomnia, and irritability are observed for a short time after the bath, and sometimes a transient recurrence of the rheumatic pains. The hot-air baths are serviceable in the different forms of apyretic rheumatism. The profuse diaphoresis is never debilitating, but the duration and number of the baths should not exceed the limits assigned to hydrothermic treatment.—*Journal of Balneology and Dietary*, August, 1891.

THE ACTION OF HYDRASTINE UPON THE VASCULAR SYSTEM AND THE UTERUS.

Authorities are divided (*Les Nouveaux Remèdes*) upon the mode of action of this drug on the vascular system. Some have observed an increased blood-pressure and slowing of the heart's action, while others affirm that the drug paralyzes the vascular system. The uterine contractions provoked by hydrastine are due, according to some, to the direct stimulation of the muscles and of the cardiac nerves; according to others, to the stimulation of the central nervous system. It was for this reason that Serdsteff had undertaken new experimental researches upon frogs (sixty-two experiments) and upon warm-blooded animals (fifty-seven experiments). These are the results obtained by this experimenter:

Given in a small dose, hydrastine provoked, in frogs and in warm-blooded animals, slowing of the heart's movements, owing to a stimulation of the inhibitory apparatus, both peripheral and central. Small doses always increased blood-pressure; by larger doses it was lowered.

These differences depended upon the state of the vaso-motor centre. Small doses were not followed by convulsions, and did not paralyze either the respiration or the heart. He thinks, then, that if some observers have verified the paralyzing action of hydrastine upon the vascular system, it must be those who have given larger doses of the remedy. Regarding the influence exercised by hydrastine upon the uterus, the voluntary or rhythmic contractions of this organ would be increased in their strength, their number, and their duration.

Hydrastine does not act *directly* upon the neuro-muscular apparatus of the uterus, but *indirectly* by the intervention of the central nervous system, and that very probably by way of the vaso-motors.

In sustaining these obtained results, the experimenter counsels the use of hydrastine in all those cases of hemorrhage where it would be, for one cause or another, unwise to await strong contractions of the uterine muscles, and where it is of the greatest importance to attack the bleeding through the vessels of the uterus.—*Archives of Gynæcology*, August, 1891.

EFFECTS OF MEDICINAL AGENTS UPON THE COMPOSITION AND REACTIONS OF THE URINE.

The urine of persons to whom salol has been administered precipitates the red oxide of copper when tested with Fehling's solution. With the polariscope, the urine in such cases polarizes to the left. It is observed that, if the urine should at the same time contain glucose, the reading by the polariscope would be too low, and the result would indicate a smaller proportion of sugar than is really present. In order to distinguish the salol urine from saccharine urine, the follow-

ing process is recommended: "A tube of the capacity of fifteen cubic centimetres is half filled with the urine, previously treated with basic acetate of lead. To this are added five centigrammes of hydrochlorate of phenylhydrazin and twenty centigrammes of sodium acetate. The liquid, which assumes a yellow color, is heated in a water bath to 100° for half an hour, and then allowed to cool, when the precipitate formed is examined microscopically. If due to derivatives of salol, the precipitate is amorphous; if to sugar, it is composed of small silky crystals of phenylglucosazone, which are at all times grouped in tufts." Hischl considers this phenylhydrazin test a perfectly trustworthy one. If the urine gives typical needles of phenylglucosazone, it certainly contains glucose. It is essential, however, that the test-tube should be allowed to remain one hour in the water bath. If this is done, the precipitate caused by glycosonic acid, if this substance should be present, is wholly amorphous and easily distinguishable from phenylglucosazone. Levulose cannot be distinguished by this test, but requires the polarimeter. Lactose found in the urine of nursing women also furnishes needle-shaped crystals which are about ten times the width of phenylglucosazone, and do not show the same orderly arrangement. Their melting-point is 200°. Maltose gives a precipitate which occurs in yellow tablets, melting at 82°.

Hæmatoporphyrin has been noticed in urine, giving it a port-wine color, without being accompanied by albumen, sugar, bile, or blood. Salkowski noticed this occurring in three cases, and attributed the presence of the pigment to the fact that the patients were at the time taking sulphonal. V. Harley and S. Torup report a case of a woman treated by chloral and sulphonal, in which the urine was of this character. R. Stockman states that after the administration of balsam of Peru no disturbance of the kidneys results, but the urine gives a precipitate with nitric acid resembling that due to the presence of albumen, except that it is soluble in alcohol. This also has been noticed after the administration of copaiba.—*Journal of Balneology and Dietary*, August, 1891.

THE TREATMENT OF DIABETIC COMA.

In a recent number of the GAZETTE we called attention to the treatment of diabetic coma through the intravenous injection of saline fluid containing chloride of sodium, chloride of potassium, sulphate of sodium, phosphate of sodium, and bicarbonate of sodium, as suggested by Dr. Hilton Fagge and extended by Dr. Dickinson. In the *Medical Chronicle* for August, 1891, DR. ERNEST S. REYNOLDS writes that in the last twelve years he has seen about twenty cases of diabetic coma, all proving rapidly fatal with the exception of the last two, which were treated by the method of Dr. Dickinson, with the exception that, instead of using transfusion, he used the stomach for the introduction of the saline liquid into the blood. This was quite feasible, as all the successful cases were not absolutely comatose. An aperient was ordered, and the patient was directed to drink during the night at least a gallon of fluid, together with an ounce every hour of a mixture containing sixty grains of potassium to the ounce. The next day the patient was slightly better, and the treatment was continued for twelve hours, the citrate of potassium being lessened in quantity. In three days all symptoms of coma had passed away, the sugar had again increased in quantity, the acetone had disappeared from the breath and the urine, and the albuminuria had entirely ceased.

The second case was somewhat similar, and was treated in much the same way, and likewise was relieved of the threatened symptoms of coma, although, of course, his diabetes likewise continued.

The point which is especially worthy of notice is that as probably no case of recovery from diabetic coma is known, it is absolutely necessary to diagnosticate impending coma in its earliest stage, and to so deal with it as to prevent unconsciousness coming on. The chief points to be noticed in this early stage are: A distinct sense and appearance of increased illness, often with loss of appetite, increased weakness, slight drowsiness, pain in the left hypochondrium, a labored respiration, the expiration being especially prolonged, an acetone-like smell in the breath and urine, lessened excretion of sugar, so-called acetone reaction (port-wine coloration with perchloride of iron) in the urine, and albuminuria. When these symptoms are present the patient is in the greatest danger.

The treatment advocated is as follows: Absolute rest in bed, purgation (but not to an excessive degree), a slight relaxation of the diabetic diet, large doses of citrate of potassium, and very large quantities of fluid taken internally. These fluids may consist of milk, lemonade, tea, water, or even barley-water,

variety being necessary in order to induce the patient to take a sufficient total quantity, which should amount to nearly a gallon in twelve hours.

Reviews.

LECTURES ON TUMORS. By John B. Hamilton, M.D., LL.D. The Physician's Leisure Library.
Detroit: Geo. S. Davis, 1891.

The above work is a course of clinical lectures delivered by the author to his class of students, and, as an introduction to the study of this most interesting and important subject, in connection with the study of medicine, it will well repay a careful perusal before the reading of more complete and elaborate works are undertaken. The author has, in a brief *résumé*, given the outlines of his subject, and while we are not advocates of such short treatises upon such a large subject, yet as a foundation to build upon we can advise Dr. Hamilton's little work as one which will interest and instruct the reader.

J. H. C. S.

PRACTICAL INTESTINAL SURGERY. By F. B. Robinson, B.S., M.D. The Physician's Leisure Library. Vols. i., ii.
Detroit: Geo. S. Davis, 1891.

Our author makes the statement that "no man should enter the abdominal cavity who has not trained himself for the work." In our opinion the above quotation is equally applicable to all surgical operations, and a special training in any procedure of a surgical nature must necessarily improve the technique of the operator; therefore, while admitting that the frequent repetition of any or all surgical operations tends to perfect the operator, yet we are not inclined to exclude any surgeon from performing any operation, provided he has given the necessary study and practical manipulation to the operation. In a word, we are not believers in exclusive specialism; but judging surgical operations from the stand-point of a thorough surgical knowledge and experience, their performance is not to be exclusively confined to any special surgeon.

The two small volumes of Dr. Robinson are an experimental pathological study of "Intestinal Surgery." The number of experiments reached one hundred and seventy-five, and the conclusions drawn from this large number of difficult operations upon the abdominal cavity have not only very materially added to our knowledge of the subject, but they have also given us many improvements in methods and technique. The work is a decidedly valuable addition to surgical literature.

J. H. C. S.

LE VÉGÉTARISME ET LE RÉGIME VÉGÉTARIEN RATIONNEL, DOGMATISME, HISTOIRE, PRATIQUE. Par le Dr. Bonnejoy (Du Vexin), etc. Précédé d'une Introduction par le Dr. Dujardin-Beaumetz.
Paris: Librairie J. B. Bailliere et Fils, 1891.

As an indication of the undercurrent of thought, philosophical and theological, one may point to antivivisection and vegetarianism as showing the deeper stream that is daily and hourly sweeping into its flood more of the thoughtful and earnest, whether it be better to eat flesh or worse to kill the brute to obtain it is the question, and a certain grade of mind, after reaching a certain point, drifts towards the vegetable diet from sheer necessity and consistency.

We have in this book brought together all that can be said in favor of a vegetable diet, and all and more than all that can be said against the eaters of meat. They will find themselves reviled and berated soundly in its pages. "Corpse-eaters" is a mild form of opprobrium which the author frequently bestows upon them; but he has dragged together every argument that he can find or invent, without regard to the force of it or to its truth. How far astray he goes will be readily seen when we find him actually inverting and reversing the biblical account of Cain and Abel to prove his point. Cain should have been a bloody corpse eater and his sacrifice should have been animal, for he was a murderer; and poor innocent Abel should have meekly offered the fruits of the earth, so he makes him do so. Possibly Dr. Bonnejoy is one of the fatal first fruits (French) of the higher biblical criticism.

The author supplements his vegetables with milk and eggs, and kindly allows us to cook them, but fails, we think, to prove that the energy and restless activity of modern life can be sustained by such a diet. While we are ready to grant that the civilizations of the East—the meditative philosophers and the native hordes who live a totally different life from ours—may succeed in subsisting on it, and if, as the author endeavors to prove, most of our diseases are due to meat diet, surely most of our extra resistance to disease comes from the same source. And whence, we would ask, come the diseases of the vegetarians? India is the home of cholera, and the home

of vegetarianism also; while many European physicians have remarked upon the ease with which the natives of Eastern climes succumb to disease, almost without a struggle. If we admit that the Eastern civilization is superior to the Western,—that we are all wrong in our ways,—and if we can convince and convict the Western world, then, with the total abolition of progress and all that it means, we may go back to a diet of rice and beans. Our great discoverers will become great philosophers, and instead of the busy stir of Wall Street quiet will settle down, and where once commerce jostled and crowded, half-clothed sages, in dirt and neglect, will sit in the sunlight and con the problems of existence. As it is, however, we let them do that sort of thing in Germany. E. W. W.

THE PRACTICE OF HYPNOTIC SUGGESTION, BEING AN ELEMENTARY HAND-BOOK FOR THE USE OF THE MEDICAL PROFESSION. By George C. Kingsbury, M.A., M.D., Dublin.
Bristol: John Wright & Co., 1891.
London: Simpkins, Marshall, Hamilton, Kent & Co. (Limited), 1891.

This is a very timely book, and one that comes to us with authority. Not only the methods of inducing hypnotic sleep, the nature of the cases likely to be benefited, are given, but the book is in good part devoted to a refutation of the reckless arguments that have been used against hypnotism. The author admits certain dangers and denies others in toto. In the case of the admitted dangers he suggests what he considers perfect safeguards against them, or shows that they are no greater if as great as the dangers of chloroform or ether. The part devoted to medical jurisprudence in its relation to hypnotism is excessively interesting; and the author has carried his investigation into minute details, anticipating what will be the difficulties in the future in a very curious way. Some of his details are new and unexpected. He is a strong advocate of hypnotic suggestion, and its powerfully good results in dipsomania and general moral misdirection. He claims that there is no evidence that the mind is ever weakened, but always the better for suggestion.

Of Dr. Luys's transfer experiments he has, after careful investigation and repetition, very little opinion, although he considers Dr. Luys thoroughly honest in his convictions. The "sealed tube" business also seems to him very doubtful, and the magnetized bar experiments fall under the same suspicion. The book is full of illustrative cases. After reading the book through, we incline to the belief that the author's medico-legal speculations are the most valuable part of it, and show better than anything else the immense difficulties of the subject in its relation to the public. In short, back of the hypnotism of to-day there lies a vast unexplored field of knowledge—possibly attainable, possibly not—of sinister import as it looks at present, but possibly of incalculable value to the human race. It is no wonder that enthusiasts grasp at it as the great future hope, the vast reformatory agency of the future, before whose suggestive agency all the fixed bad habits, all the results of long-continued evil methods and surroundings will fade away. If one-tenth of what some have claimed for it be ever realized we shall see wonders. It only occurs to us that it was a pity that Omnipotence did not in his deep sleep (perhaps hypnotic) suggest to Adam that on waking he should refuse all fruit, no matter how tempting, or to Eve that she should avoid yielding to any serpentic suggestion whatever. E. W. W.

THE DISEASES OF PERSONALITY. By Th. Ribot. Authorized translation.
Chicago: The Open Court Publishing Company, 1891.

It will hardly do to discuss hastily such a book as this because it is small and thin. It raises great questions, and to the thoughtful it must prove either a positive help or a positive hinderance. The materialist will read it with joy and place it among his sacred books,—books that help him to prove his theories,—that he came from nothing and to nothing returns, that all his boasted intellect and culture are but the foam on the wave-crest. The spiritualist, in the deeper sense, will see in it the attack of a skilful enemy whose thrusts find out many a weak spot in his armor, and whose attack he will hardly know how to evade. For from its premises, if they are right, the argument is flawless and unanswerable, and neither the orthodox believer, nor the agnostic reader will be able to combat them successfully.

Among the first questions to ask would properly be, Is the author exactly right in his definition of personality, and are personality and the "Ego" identical terms for one and the same thing, or is the Ego more complex? Again, from one possible view, the personality may be as unsubstantial and as fluctuating as the author believes, and still the author may be wrong. In other words, if he has

reasoned fairly, from fairly-observed and recorded facts, his conclusion has a real value, though he himself may not see its exact value in all its relations.

"If the life of every organ comprises two periods,—one of relative rest or assimilation, the other of activity or disassimilation,"—then to prove that the brain is but an organ and consciousness its function, one must prove that in deep sleep consciousness is abolished, to reappear only when its basis is reaccumulated. This the author establishes to his own satisfaction.

The author defines the "Ego." He does not define it from above, like the spiritualist, but goes down to the elementary phenomenon of life for its origin,—organic sense. Hence there is a physical basis for personality formed from the combined organic sensations of the body, united in the general feeling of existence. "It is clear that the exclusive faith which psychology has so long accorded to the nerve data of consciousness would throw into the shade the organic elements of personality;" "but personality," the author argues, "is not a mysterious attribute dropped down from the skies and without antecedents in nature, but organic consciousness stands in inverse ratio to the higher psychic development;" hence personality must vary as its organic bases vary, must be diseased or altered as these are diseased or altered.

"The Ego exists only on the condition of continually changing." Exuberant vitality or depression are the commonest alternating conditions, scarcely to be called morbid. Now, if either condition persists, we have formed "a new physical and mental habitude."

Finally, such a change may occur that the individual seems to himself something like, but not the same as, himself. One will even allude to himself as "it." "Here the previous healthy individual and the present unhealthy one constitutes two distinct phases of personality, or a double personality. The feeling of identity between them is lacking." "The recollection remains, but there is no amalgamation." Thus the author leads up step by step, by cited cases, to double physical and then to double mental personality. "Double personality," he says, "is but an abstraction. Each case asks for a particular interpretation." "Personality being itself complex, its perturbations must be multiform."

The Ego is affirmed to be impenetrable and a perfect unity, but "one Ego cannot be another Ego," because one organism cannot be another organism at the same time. Here the author studies to some purpose double monsters, and still further follows the subject up by studying twins, and at the close of the chapter deduces, "as the organism, so the personality." The reader will find in this book, as he can judge by this time, condensed and clearly expressed, a strong and thorough argument for the materialistic view of personality. "The unity of the Ego is coördination," is the author's conclusion. Personality and the Ego are pretty much one and the same at any one time. Anything further included in the "Ego" he does not believe in because he knows nothing about it. Possibly the very mutations of personality might suggest that while it was truly dependent upon organic bases there might yet be a something, evading physical and psychic analysis, of which the varying phases of personality were but passing attributes, and with this thought we leave the author to the curious reader.

E. W. W.

THE GENUINE WORKS OF HIPPOCRATES. Translated from the Greek, with a Preliminary Discourse and Annotations. By Francis Adams, LL.D., Surgeon. Two volumes in one.
New York: William Wood & Co., 1891.

This is a reprint of a publication of the Sydenham Society, and has also appeared in separate volumes in the "Wood's Medical Library" series. The large volume before us certainly seems more formidable and impressive, but a comparison shows that, except paper and binding, it is the same work, already noticed in this journal. All who would be scholars as well as physicians, who feel the need of all possible culture and knowledge, should, if weak in Greek, read a good translation of our author. It is no longer the thing for the medical man to quote largely from the old masters; quite the reverse. He quotes only from the newest lights, which are farthest off, and one can hardly promise that a reading of the book will really add to his stock of practical knowledge. Hippocrates seems to the modern student to have dreadfully needed a four years' course and some post-graduate instruction, but we are apt to forget how much he observed has passed into the axiomatic knowledge of the profession and belongs to every one, claimed by no one; in short, we would say that the Hippocratic oath is the most valuable part of the book, and can be read and remembered by every medical practitioner with profit.

E. W. W.

SCIENTIFIC MEDICINE IN ITS RELATION TO HOMŒOPATHY. By Professor Theodor Bukady, M.D., of the Buda-Pesth University. Translated from the German by Rudolph F. Bauer, M.D.
Philadelphia: Boericke & Tafel, 1891.

A careful reading of this book, which can be done in a short time, fails to convince us that its title is anything except misleading. It professes to be an examination "of Koch's method" in its relation to homœopathy, and, of course, claims its brilliant (!) results as due to its harmony with the theories of Hahnemann. We are quite willing to believe that a harmony between the Hahnemannian theories and anything mentionable may by ingenuity be proved, but the author goes much further, ventilates his own modifications of the immortal theories in question, and fortifies his position at every point with long quotations from his own writings, which he seems to have studied very carefully. The essay is addressed to laymen, and must have had the desired effect if any laymen were present to hear it, for laymen are a "simple folk," and easily captured if one goes to work the right way. Any one desiring an insight into a certain school of homœopathic practice may get some hints from reading this book. E. W. W.

Correspondence.

LONDON.

(From our Special Correspondent.)

Of all the events of the month, there is none on which a greater interest has been concentrated than on the meeting of the International Congress of Hygiene in London. Never before has there been a more brilliant assembly of scientists, and probably the subject-matter of the discussions has never before been of such vast importance. I think, however, I am not wrong in saying that the crowning triumph of the Congress was the discussion on "Immunity" in the Section of Bacteriology. Here the great men of all nations had their say on this most interesting subject, which was discussed from every point of view. But the key-note of the discussion was undoubtedly given by Dr. Roux in his opening address, and it early became evident that the work would resolve itself into a struggle between those whom we must now call the "humoral" and the "cellular" pathologists.

In introducing the subject of "Immunity, Natural and Acquired," Dr. Roux reminded the section that the great bulk of the work now being done took as its starting-point two subjects with which the name of M. Pasteur would always be honorably associated,—the attenuation of a virus and preventive inoculation. Pasteur had succeeded in replacing the old dangerous method of conferring immunity by inoculation by the safer one of preventive inoculation with an attenuated virus. The methods he had adopted to obtain this attenuation were two,—first, the prolonged exposure of cultures to air at a suitable temperature; and, secondly, the passage of the microbes through the bodies of different species of animals. There were other methods of arriving at the same end, such as the action of heat, antiseptics, compressed oxygen, and light, but the first two methods had been found the most satisfactory. In the early experiments on immunity it was always this attenuated but living virus which had been introduced into the animals; recently it had been found that a similar end could sometimes be obtained by the introduction of the chemical substances produced by the virulent bacteria, without actual introduction of the living bacteria.

Dr. Roux then placed before the section an outline of the doctrine of phagocytosis, associated with the well-known name of Professor Metchnikoff. It had been proved by this observer that certain mesodermic cells, which he called phagocytes, had the power of swallowing up other cells and bacteria, and that the bodies thus swallowed underwent a process of intracellular digestion. He showed that this power of the phagocyte cells was a most important one in connection with the question of immunity; for if a virus were inoculated into a resistant animal, the microbes were found to be rapidly devoured by the cells, whereas in the case of a non-resistant animal they remained free. Phagocytosis was thus confined to resistant animals. It would appear also that similar cells are charged with the defence of the human organism, and enter into conflict with the bacteria which infect it. It might be advanced against this statement that in some diseases, such as tuberculosis and leprosy, bacilli were found specially enclosed in cells, and yet the disease proved fatal. This might mean, however, that although in these diseases there is intense phagocytosis, the resistant power of the invader may under certain circumstances be too strong for the cells or the other means of protection. Even in fatal cases, however

signs of the struggle were not wanting,—certain of the cells were frequently found filled with dead bacilli. The establishment of the theory of phagocytosis did not necessitate an invariable victory on the part of the cells. The fight could, however, only be observed in immune or partially-protected animals, and was more evident in proportion to the degree of immunity.

The opponents of the theory might fairly ask two questions,—In what manner are the leucocytes attracted towards the microbes? Why are these cells, which in the case of immune animals destroyed the microbes, incapable of doing so in susceptible animals? In order to explain this, Metchnikoff, when he propounded his theory in 1883, made two assumptions,—1, that the cells were attracted to microbes and foreign particles in virtue of a special sensibility shown towards all foreign bodies introduced into the tissues; 2, that in the case of artificial immunity, the cells formed the habit during their preliminary struggle with an attenuated virus by virtue of which they were afterwards able to seize on the more virulent microbes. A simpler explanation was now, however, possible. Leucocytes might have the property, similar to that possessed by the zoosperms of the myxomycetes, of being attracted by some bodies and repelled by others. MM. Massart and Bordet had found that the products of microbes had a very marked chemical action on leucocytes. When a virus was introduced into the body it proliferated, and secreted a substance, which attracted the leucocytes to the seat of growth. In proportion as the power of the virus was greater, so much the more energetic became the poison secreted by it, till, in certain cases, the cells which flocked towards the bacilli became paralyzed by it and rendered incapable of taking up the microbes, which were, therefore, able to multiply without hinderance. Again, in certain diseases, such as chicken-cholera, the virus appeared to be still more powerful, and to exert a power on cells even at a distance, repelling them. This would explain the entire absence of phagocytosis in chicken-cholera. But if the inoculated animals had been previously rendered immune either by injections of attenuated virus or of certain doses of the bacterial products alone, then the conditions were changed. In this case introduction of virulent microbes was followed by an attraction of phagocytes towards the seat of inoculation, in the same way as occurred in other diseases, and these acclimatized cells possessed the power of enclosing and digesting the microbes before they had time to secrete a lethal dose of their poisons. The battle took place at the very commencement. If the leucocytes were not victorious then, their powers were afterwards entirely paralyzed by the defensive poison secreted by the microbes, which therefore gained the day. It would be seen, then, that every cause which interfered with the entrance of leucocytes to the seat of inoculation favored the chances of general infection. The theory of M. Metchnikoff did not, however, exclude other factors in the protection of the organism. It only claimed for the phagocytes a wider sphere of action, and a greater protective power than any other means. It seemed to explain all the observed facts, and far from being disproved by opposition, gained in probability with every fresh attack, which was a proof of its soundness.

After this admirable introduction, which was listened to with great interest, came very free criticisms from the partisans of the "humoral" theory. These seemed to be agreed as to the inefficacy of the cells, but are by no means at unity in regard to the actual factor in the blood or serum which produces immunity.

The first speaker was Dr. Buchner, of Munich, who said he could not accept Metchnikoff's doctrines, for four reasons:

1. Many observers had failed to observe phagocytosis even in white rats inoculated with anthrax (these animals being most resistant to the disease).

2. In diseases ending fatally, such as tuberculosis, mouse-septicæmia, etc., the microbes were frequently found in the cells, and yet death took place.

3. The experiments of Petruchky, Baumgarten, and others showed that anthrax bacilli, even if protected against the action of the leucocytes, perished in contact with the living fluids of the body of immune animals. He thought that the experiments of Metchnikoff, which seemed to show that these very fluids were an excellent pabulum for anthrax bacilli, could be explained by the fact that he introduced more bacilli than could be destroyed by the living fluids of his animals; a given quantity of serum had only a certain germicidal value. If certain microbes were placed in a given quantity of serum, one of two things might happen,—either they would be completely destroyed, or they would flourish luxuriantly, their fate depending on the number introduced. If, instead of placing them

directly in contact with the serum, the microbes were wrapped in sterile cotton-wool before introduction, and thus protected in some measure from the action of the great body of the serum, it would be found that after twenty-four hours they would begin to multiply vigorously. The bactericidal value of serum, therefore, disappeared soon after death.

Buchner, therefore, regards the migration of leucocytes to the point of inoculation as a secondary phenomenon. He supposes that the bacilli first wage war with the blood and serum, and that, being weakened thereby, they discharge the protein substances from their interior. These latter substances have been said to possess a powerful attractive force for leucocytes,—far more powerful than that of the products of bacterial growth in cultures. Thus all that Buchner will admit for the cells seems to be, that they may come to clear the field of the *débris* of weakened bacteria produced in their conflict with the serum. The facts which he advances to prove a connection between the immunity of a given animal against a given disease and the bactericidal action of its blood on the microbe producing the disease are the following: 1. The blood and serum of immune animals have a powerful bactericidal value. 2. The blood and serum of susceptible animals have no bactericidal power on anthrax bacilli. 3. The blood and serum of animals rendered artificially immune have a greater bactericidal power than those of unprotected animals. 4. A virus grown in the blood or serum of an artificially immune animal always becomes less virulent towards unprotected animals.

Dr. Behring was followed by Mr. E. H. Hankin, of Cambridge. This speaker claimed that he had foreseen the bactericidal power of serum from theoretical considerations, and did not regard it in any way as a vital phenomenon. He had isolated from the spleen and glands of immune animals a substance which he called cell globulin B, which had a most marked bactericidal value. He regarded the undoubted power of serum as due to the existence in it of ferment-like bodies capable of being isolated. He also gave an account of some experiments on the influence of diet on the susceptibility of wild rats to anthrax. Taking two series of four animals each, he fed one lot on bread paste, and the other on bread and meat, and after a time inoculated one of each lot with anthrax. Only the bread-fed animals died, and the others were then killed. He found in the spleen and glands of the meat-fed animals plenty of what he calls the defensive proteid, while in the other animals this was absent. He finds also that very young rats are not immune to anthrax, but can be made so by injection of the blood of their parents. The existence of these defensive proteids seems to him sufficient to account for the immunity in the animals in which they are found.

The crowning point of interest in the discussion was reached, however, when Professor Metchnikoff himself rose to reply to his opponents. He was greeted with most enthusiastic cheers, and had evidently been saving himself for this opportunity. Although generally—and partly, probably, because French is to him a foreign language—a very quiet speaker, he on this occasion spoke with extraordinary energy, and certainly with the language borrowed many of the oratorical manners of our French *confrères*. He considered that of all the arguments which had been raised against the theory of phagocytosis, the most important was that raised by Behring and Nissen,—viz., that the serum of guinea-pigs acclimatized to the vibrio Metchnikovii had bactericidal powers on the same vibrio. The serum of these animals would kill the vibriones in a few hours, although they multiplied freely in the serum of normal animals. However, was this fact, as Behring thought, capable of affording a complete explanation of the acquired immunity of protected guinea-pigs? Professor Metchnikoff declared that his own researches proved the contrary, for on studying the phenomena which occurred in the living animal, he at once noticed that the bacilli introduced into immune guinea-pigs remained alive for a very long time. In order to see this, it was only necessary to inoculate a pigeon with the vibrio Metchnikovii, and after a time to take a drop of the exudation from the seat of inoculation. This, when placed in a warm chamber and examined under the microscope, showed a large number of microbes enclosed in cells, and some also in the liquid portion. The cells died after their removal from the body, and one could observe the microbes developing in their interior, causing the cell to swell and eventually to burst, setting free the contained microbes. On taking a trace of this new and luxuriant culture and introducing it into the dead serum of an immune guinea-pig, not only was the serum unable to kill the vibrios, but it furnished a very excellent nutrient medium for them,—better even than that from an unprotected guinea-pig. Thus the study of the phenomena in living immune

animals furnished further evidence in favor of the phagocytosis theory. No theory of attenuation in the body of an immune animal, or of neutralization of the toxine, could apply to this case, for the microbes remained very virulent, and even immune animals are found to be quite as susceptible to the toxine of the vibrio as unprotected animals. One must, therefore, said the professor, never be content with studying the phenomena of immunity outside the organism. Buchner had insisted that in order to demonstrate surely the bactericidal power of serum it was necessary to take a small quantity of the microbe and mix it well with a large quantity of the serum in a tube. If the experiment were conducted as in the case in which cotton-wool was used to protect the microbes for a time from the serum, no bactericidal power was evident. Now, when we inoculated animals, did we not introduce a small mass of microbes under their skin, which did not spread freely in the blood and surrounding tissues, but remained localized somewhat as in the case of the cotton-wool protected microbes? In his opinion, this experiment of Buchner's threw no doubt on the phagocytosis theory, but was distinctly in its favor.

Summing up his researches, he came to the conclusion that phagocytosis occurred whenever an animal recovered from an infectious disease; the death of the animal was proof of the absence or insufficience of the process of phagocytosis.

I would have wished to continue this letter for several columns, but I know that the demands on space are many. I hope, however, to devote part of my next letter to a continuation of the study of some of the points raised in this highly successful congress.

Notes and Queries.

INFLUENCE OF ALKALIES ON THE BILE.

W. N. NISSEN has recently undertaken some experiments as to the influence of the alkalies on the secretion of the bile on a dog with biliary fistula. His results are recorded in *Les Nouveaux Remèdes* for August 8, 1891. After having first satisfied himself that the quantity of bile secreted was subject to but little variation, and that water, even when administered in very large amounts, was without influence, he proceeded to study the action of sodium chloride, sodium sulphate, bicarbonate of sodium and the acetate of potassium, phosphate of sodium, sulphate of magnesium, and Carlsbad salts. From his experiments it results that of the alkalies, concentrated solutions considerably diminish the quantity of bile excreted. In dilute solution—one-half to one per cent.—they produce no influence upon the secretion of bile; the acetate of potassium is most active in reducing the biliary secretion, which may be fifty-seven per cent. below normal under the action of this drug. Its action, however, is only transient. The author believes that the diminution of the biliary secretion under the influence of the alkalies is due to impoverishment of water, for he finds that the more concentrated the alkalies the greater the diminution in the amount of the bile, which becomes more concentrated and the proportion of coloring-matter in the bile becomes increased. The therapeutic action of alkalies in jaundice is not attributable to their cholagogue action, but to the diminution in the formation of the bile and to their solvent action on the mucous membrane, which constricts the biliary ducts. In jaundice the author advises the association of potassium acetate with Carlsbad water.

CAUSE OF THE FIRST SOUND OF THE HEART.

DR. BERRY HAYCRAFT (*Journal of Physiology*, vol. xi. No. 6) maintains that the first sound of the heart is valvular. He finds that the sounds of the excised and bloodless heart—in which, of course, the valves do not come into play—are much lower in pitch than the first sound. In an experiment on the excised heart of a calf he rendered at the same time both the auriculo-ventricular and the aortic valves equally and suddenly tense by means of a stream of water, and found on auscultation that the sound of the auriculo-ventricular valve was a minor third lower than the sound of the aortic valves. He does not deny that the valvular first sound is accompanied by the so-called muscle sound; but a muscle is not like a piano-string, vibrating so as to produce a musical note; its motions are merely transmitted to the middle ear, causing vibrations of the membrana tympani, and it is these that are heard. The muscle plays the part of a drumstick, not of a drum; and when one listens to an excised beating heart and hears a low impure musical note, it must not be imagined that this is given out by the muscle, for it is the resonance note of the stethoscope and ear that is heard, called forth by the moving mass on which it is placed. When

the heart is within the chest, both the resonance tones of the chest, the stethoscope, and the ear are heard; whereas in auscultation, wherever the stethoscope is placed and whatever instrument is used, the valvular high-pitched note of the first sound is always the same; the accompanying resonance notes, on the other hand, may vary. These are rounded and lower in pitch over the epigastrium, higher and shallower over the hard ribs; they vary with the stethoscope used, and may be raised in pitch by inflating the middle ear with air through the Eustachian tube.—*British Medical Journal*, August 22, 1891.

DEPILATORY POWDERS.

DR. CLASEN says (*Monatshefte f. Prakt. Dermat.*, 1889, ix. 541) that among the best depilatory powders are sulphohydrate of sodium and sulphide of barium. As to the sulphohydrate of sodium, he says that, used as a paste, one part to eight of water, and allowed to remain on for a very short time, it acts well. But it deteriorates very rapidly and is dangerous to give to a patient, as it is quite capable of producing scars. The sulphide of barium is a safer powder for the purpose. It may be used by mixing fifty parts of it with twenty-five parts each of starch and oxide of zinc. This is mixed with water so as to form a soft paste and spread upon the face. After ten minutes it is scraped off, and leaves a smooth skin.—*Medical Tribune*, August 15, 1891.

BORAX AND CHLORAL.

The growing practice of ordering "borated chloral," or a mixture of borax and chloral, for certain throat affections, has induced a French pharmacist, M. DUJARDIN, to publish a note calling attention to the fact that the product supplied will vary with the temperature at which it is prepared (*Bull. Gén. Thér.*, July, p. 91). When the solution is made in the cold, as the borax is without perceptible action on chloral at a low temperature, the latter will remain intact in the solution. With the application of heat, however, the two compounds will react and chloroform will be liberated from the chloral and may remain in the liquid. Should the liquid be allowed to boil for a few moments, the whole of the chloral would be decomposed, and the resulting chloroform would volatilize. M. Dujardin, therefore, recommends that if in making this preparation heat be used to dissolve the borax, the solution should be allowed to cool before adding the chloral.—*Pharmaceutical Journal and Transactions*, August 29, 1891.

CREOSOTE GIVEN BY THE RECTUM.

DR. REVILLET (*Gazzetta degli Ospitali*, 1891) administers creosote by means of rectal injections. He uses the following:

℞ Creosot. purissim., gm. 2–4 (gtt. xxx = ʒi);
Ol. amygdalar. dulc., gm. 25 (ʒvi);
Aq. destillat., gm. 200 (ʒvii);
Vitell. ovi., gm. 1.

The injections are generally given in the evening before the patient retires, after a preceding injection to clean out the intestine. Absorption takes place at once, the patient notices the characteristic taste, and the urine assumes the blackish or black-green color. At the same time the temperature falls, as after antipyrin. The injections are well supported and absorbed. It is taken up by the branches of the portal vein and eliminated by the salivary glands, pulmonary mucous membrane, and, above all, by the kidneys. One should be certain of the soundness of the liver, heart, and kidneys before prescribing creosote in large doses. In tubercular diarrhœa the injections seem to arrest the discharges.—*Cincinnati Lancet-Clinic*, September 19, 1891.

FOR RHEUMATISM AND LUMBAGO.

HOLLISTER gives the following in doses of 1 teaspoonful three or four times a day:

℞ Potassium iodide, 15 gm.;
Potassium bromide, 15 gm.;
Tincture of colchicum seed, 30 gm.;
Syrup of bitter orange-peel, 50 gm.;
Distilled water, 150 gm. M.

Sig.—The dose should be augmented until the bowels are moved.

—*National Druggist*, September 15, 1891.

SALICYLBROMANILIDE A FRAUD.

Antinervine was the name under which RADLAUER, a Berlin apothecary, launched, some years ago, what pretended to be a new analgesic and antipyretic, the chemical designation for which, in conformity with its alleged constitution, was given as salicylbromanilide. The inference was that this body was analogous to bromacetanilide, the salicylic acid residue having taken the place of the acetyl residue. Having become suspicious of this substance, E. Ritsert subjected the same to a rigid examination

(*Pharm. Zeit.*), and found, not a chemical unit, but a mechanical mixture of salicylic acid, ammonium bromide, and acetanilide. A number of samples, some older and some new ones, were analyzed and gave approximately the following composition:

Salicylic acid, 25;
Ammonium bromide, 25;
Acetanilide, 50.

—*Western Druggist*, August 15, 1891.

A NEW ANÆSTHETIC.

It is a long time ago since John Hunter, when cutting into the cock's comb, noticed the anæsthetic effects of cold. Although his primary object was to restrain bleeding, he nevertheless remarks that the operation was apparently painless. Dr. Richardson also, noticing the benumbing effects of cold, devised his apparatus for its artificial production by spraying ether on the part to be operated on, but from some cause ether spray fell into disfavor with surgeons, and was finally superseded by cocaine as a local anæsthetic. Cocaine, however, has not fulfilled all the promises held out for it by its advocates, it is not perfectly innocuous, and it has been blamed for delaying the healing of the cut surfaces of the part anæsthetized by it. The search for a new anæsthetic, local in its action and non-poisonous, was recommended, and, if we accept M. Monnet's statements, we have in the chloride of ethyl all that is sought. Already it has found an advocate in Dr. C. Rédard, Clinical Professor at the Geneva School of Dentistry, who speaks highly in its praise.

Chloride of ethyl, C_2H_5Cl, is a colorless mobile liquid, having a peculiar and pleasant odor, and a sweetish, burning taste. It boils at 12.5°, at 0° possesses a specific gravity of .9214. It is slightly soluble in water, but dissolves readily in alcohol. It is sent out for medicinal use in hermetically sealed glass tubes containing a little more than two drachms each. When required for use, the point of the tube is snipped off, and the warmth of the operator's hand is sufficient to cause a very fine jet of the chloride to be projected on the part to be anæsthetized. No apparatus is required,—a great advantage. Up to the present its use has been confined to dentistry and as an external application in neuralgic affections, but there is little doubt that in a short time its value will be tested in general surgery. Although the use of the chemical as an anæsthetic is new, the chloride is one of our oldest preparations. Of course, it was not known as chloride of ethyl, for the name "ethyl" was the invention of Berzelius, and the word "chloride," a little later (1812), by Sir H. Davy. But in the beginning of the fifteenth century, at the end of the ecclesiastical era in medicine, and the dawn of the Renaissance, when Brunelleschi commenced the task of reviving the love of the beautiful by copying Greek architecture and Greek statuary, even prior to the birth of Linacre, Basil Valentine, by distilling common salt and spirits of wine, having, as he says, previously united them, obtained an alcoholic solution of the chloride. "Thus is the *spiritus salis et vini* prepared." And Johann Rodolph Glauber, better known as the maker of the "sal mirabile" (Glauber's salt), in 1648 wrote, "When dephlegmated spirit of wine is poured in strong spirit of salt and digested for a long time, the spirit of wine makes a separation and kills its *sal volatile* so that a fine clear *oleum vini* swims on the top, which is not the least potent of the cordials."—*Medical Press and Circular*, August 12, 1891.

FOR WARTS ON THE SKIN.

H. Roemer, of Henfeld, Austria, writes to the *Pharmaceutische Post* that he has frequently used, and always with success, the fresh flowers of Verbascum phlomoides and of Verbascum thapsus (mullein) against warts. The flowers, freshly torn from the calix, are pressed upon the wart with the fingers, and finally rubbed smartly. The procedure should be repeated if one or two rubbings do not suffice. In the great majority of cases, one rubbing suffices.—*National Druggist*, September 15, 1891.

DIGITALIN AND IODIDE OF POTASSIUM.

These two remedies have recently been attracting considerable attention from the point of view of their cardiac action, and many points have been elicited through the study of French observers, which tend greatly to elucidate their action and to show more clearly the cases in which they may be employed to advantage. In *La Médecine Moderne* for July 30, 1891, Dr. Germain Sée takes up the study of these drugs, and shows that digitalin is not a remedy which increases the energy of the heart, but acts by calling into play the elasticity of the cardiac muscle and exaggerating

the diastole of the left ventricle, which thus receives a larger amount of blood from the ventricles, and consequently expels a larger amount of blood into the arteries. As a consequence blood-pressure is elevated and the general circulation facilitated. Digitalin thus constitutes a typical remedy for cardiac lesions where there is disturbed compensation, its effects being especially manifested upon the right heart, and thus tending to remove disturbances of the lesser circulation. Iodide of potassium, which one would think was far removed in its effects from digitalin, nevertheless seems to act in the same manner by at first increasing blood-pressure as a result of the potassium element, and then enlarging the arterial area through vascular dilatation from the action of the iodine. Hence the great value of potassium iodide in dyspnœa, whether of asthmatic or cardiac origin. Dr. Sée thus believes that digitalin produces dilatation of the heart, although we must admit that clinical evidence largely tends to contradict this view. So, again, as regards the action of digitalin upon the two hearts, we can find difficulty in accepting the deductions of Sée.

ROSSBACH'S EXPECTORANT MIXTURE.

Apomorphinæ hydrochloratis, gr. i;
Morphinæ hydrochloratis, gr. ss;
Acidi hydrochlorici dil., gtt. x;
Aquæ destillatæ, f℥v.

Dose.—A teaspoonful every two, three, or four hours.

The diluted hydrochloric acid is evidently superfluous.—*American Druggist*, August 15, 1891.

TREATMENT OF AFFECTIONS OF THE EAR WITH BETA-NAPHTHOL.

Dr. Hand recommends this remedy in the treatment of the majority of chronic suppurative affections of the middle ear, maintaining that the suppuration will be arrested after six to eighteen days of its employment. He does not advise its use in acute affections, but its beneficial action is especially manifested in subacute and chronic affections and in non-complicated otorrhœa. It is, above all, indicated in tubercular lesions of the mucous membrane of the middle ear. His method of employment is as follows: The tympanic cavity should first be washed out with a warm antiseptic solution, the middle ear then insufflated, and the auditory canal and the tympanic regions then carefully dried with absorbent cotton. A small quantity of the naphthol is then blown into the middle ear, and the external auditory canal closed with a pledget of aseptic cotton. When the secretion is very dense, or when the openings in the tympanic membrane are situated high up, or when there are exuberant granulations as well as furunculosis, Dr. Hand employs an alcoholic solution of naphthol, one and a half to three per cent., which is injected into the ear twice daily, and allowed to remain for a few minutes.—*Journal de Médecine de Paris*, September 6, 1891.

BANANAS IN CHRONIC BRONCHITIS.

In cases of chronic bronchitis with difficult breathing and scanty expectoration the use of banana-juice has been highly praised. The juice is prepared by cutting up the bananas in small pieces, and putting them, with plenty of sugar, in a closed glass jar. The latter is then placed in cold water, which is gradually made to boil. When the boiling point is reached the process is complete. Of the syrup so made a teaspoonful every hour is the proper dose.—*Medical and Surgical Reporter*, September 5, 1891.

THE PHYSIOLOGICAL ACTION OF RUBIDIUM-AMMONIUM BROMIDE.

Drs. Tausk and Vas report, in the *Deutsche Medizinal-Zeitung* for August 31, 1891, some experiments which they have made with rubidium-ammonium bromide. The smallest dose which they found would produce any appreciable result was ⅓ grain. They found that the subcutaneous injection of 5 grains in a frog produced fibrillary contractions at the point of application, which soon extended to the other muscles of the body and produced convulsions, which, however, lasted but a few moments. And after four or five minutes the movements of the animal became sluggish and respiration weaker. The hind extremities became anæsthetic, and this loss of sensibility then extended to the anterior parts, so that after twenty minutes there was anæsthesia of the entire body, with the hind extremities paralytic, death resulting in about forty minutes. In larger doses these symptoms appeared more rapidly and with greater intensity.

In mammals the symptoms which followed an injection of this double salt are about the same. After the injection of fifteen grains in the rabbit, clonic convulsions occur, which, after five or ten minutes, give place to general relaxation and anæsthesia, at first of th

anterior and then of the hind extremities. The pupils are dilated, the pulsations of the heart more rapid, and the respiration slowed. After prolonged administration of this remedy, rabbits acquire a toleration of this drug, even to larger doses, yet symptoms of marked motor ataxia are present. The authors divide the action of the bromide of rubidium and ammonium into a local and a general action. The first, less pronounced than the second, consists in a fibrillary contraction at the point of injection, or when administered internally in catarrh of the gastric mucous membrane. Among the general actions, the most marked is its action on the respiratory centre. In rabbits it produces the characteristic periodical respiration described by Biot. It also produces anæsthesia of the cornea and of the mucous membrane of the mouth, with marked modifications of the spinal reflexes, which are first increased in intensity and then decreased, and then finally abolished. The activity of the heart is at first increased and then decreased. After large doses, temperature and body-weight steadily decrease.

THE ACTION OF STRYCHNINE ON THE CEREBRUM.

The majority of authorities attribute the action of strychnine to its influence on the spinal cord and medulla oblongata. These conclusions are warranted not only by the character of the symptoms produced in strychnine-poisoning, but also by the fact that after fatal poisoning by strychnine large amounts of the alkaloid are to be found in these localities, while but a trace is detectable in the cerebrum. In addition, there are no direct experiments as to the action of strychnine on the cerebrum, and but few observations have been attempted in this connection, and they are mostly of a negative character.

In the *Centralblatt für Klinische Medicin*, No. 36, 1891, is an account of some experiments by Dr. Biernacki, who has tested the action of strychnine on the cerebrum by exposing the motor centres of the cortex, determining the weakest possible stimulus which would produce a motor reaction, then injecting strychnine, and testing the changes in irritability. His results show that strychnine produces marked reduction in the irritability of the cortex, whether administered subcutaneously or locally applied. It is not clear, however, as to whether strychnine has a direct influence on the gray substance of the cortex or not. Since it is possible that the apparent reduction in irritability may be due to the action of this alkaloid on other parts of the central nervous system.

A NEW SOLVENT OF CAMPHOR.

From the frequency with which the indications for the subcutaneous injections are met with, it is evident that a good and reliable solvent for this substance is a great desideratum. Ethereal solutions rapidly evaporate. Alcoholic solutions also evaporate, and the camphor becomes precipitated, so that injections of such solutions produce severe pain or even abscess. Solutions of camphor in oil are difficult to employ, while besides possessing the disadvantage of the liability of becoming rancid.

In the *Zeitschrift für Therapie* for September 1, 1891, Dr. Karl Rosner recommends in the highest terms a solution of camphor in liquid paraphine, which, when slightly warmed, forms a perfectly clear and limpid solution. He states that he has kept this solution for more than five years without its properties becoming changed.

TREATMENT OF URTICARIA.

Dr. Quinquaud treats urticaria by the internal administration of alkalies, and, if this does not prove successful, by the administration of arseniate of sodium or naphthol. When the itching is very depressing, he uses a wash composed of 30 parts of boric acid and 5 parts of chloral hydrate in 180 parts of distilled water; or he uses a powder containing 5 parts of salicylic acid, 15 parts of oxide of zinc, and 30 parts of powdered starch. — *Internationale Klinische Rundschau*, August 16, 1891.

THE LOCAL APPLICATION OF CARBOLIC ACID SOLUTION IN THE TREATMENT OF ARTICULAR RHEUMATISM.

In the *North American Practitioner*, for September, 1891, Dr. Joseph Lane Hancock writes that for the last two years he has been treating cases of inflammatory rheumatism with a local application of carbolic acid applied in the form of a four per cent. solution on a warm flannel cloth wrapped closely around the entire affected joint.

Dr. Hancock states that his custom is to leave this dressing on over night, placing it in position just before the patient retires.

—THE—

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*CLINICAL THERAPEUTICS—LECTURES ON THE TREATMENT OF HEPATIC AFFECTIONS.**

LECTURE III.—THE LIVER AS A BILIARY ORGAN (PHYSIOLOGICAL CONSIDERATIONS).

BY PROFESSOR DUJARDIN-BEAUMETZ,† PARIS, FRANCE.

GENTLEMEN:—I desire to devote this lecture to the study of the liver considered as the organ of the biliary secretion. I shall follow the same order that I adopted in the case of the antiseptic liver,—*i.e.*, I shall give two lectures to this subject. In the one I shall briefly state what we know of the bile and its secretion, and in the other I shall examine the conclusions which are deducible therefrom and which may be of advantage to clinical therapeutics.

We shall have first of all to consider the bile-ducts, then the bile. I shall be brief on the anatomy of these ducts, referring you for fuller information to your text-books. I will only remind you that the view once maintained by Robin and Claude Bernard concerning the separation existing between the hepatic lobule and the bile-ducts is no longer admissible. Robin, in fact, insisted that the bile-ducts terminate in culs-de-sac, and that the latter are the organs that secrete the bile; while the hepatic cell has functions exclu-

* From advance sheets, revised by the author (translated by E. P. Hurd, M.D.). Lectures delivered in Cochin Hospital, Paris, France.

† Member of the Academy of Medicine, Physician to the Cochin Hospital, Paris, France.

sively glycogenic, the bile is secreted by special organs.

We now know that the bile-ducts are in relation directly with the hepatic lobule, and constitute a perilobular and intralobular network which completely envelops the hepatic cell, and it is in this cell that the secretion of the bile takes place. Then these ducts unite to form larger branches, traverse the liver enveloped in Glisson's capsule, then converge to constitute the extra-hepatic bile-ducts, which finally end in Vater's ampulla in the duodenum. This system is completed by that reservoir known as the gall-bladder, which plays so considerable a part in the pathogeny of biliary calculi.

I should not detain you by any considerations as to the anatomical constitution of these extra-hepatic bile-ducts, the hepatic duct, the cystic duct, and the choledochus, if there had not arisen questions of capital importance connected with these ducts in their relation to the mechanism of hepatic colic.

Impressed by the obscurity which exists relative to the pathogeny of hepatic colic, I undertook, twenty years ago (in 1873), with Audigé, a series of experiments on the production of this painful affection.* You will find a complete exposition of our joint experiments in Audigé's thesis, which bears date 1874.†

In introducing foreign bodies into the bile-ducts of dogs, we reproduced experimentally the symptoms of hepatic colic, and we showed that the prime cause of the colic was a reflex spasm of the muscular coat of the bile-ducts, a spasm which was brought about under the influence of the irritation of the mucous membrane of these ducts, this mucous membrane being endowed with a high degree of sensibility. Nothing more remained, in order to prove the reality of this muscular spasm, but to determine if in man the bile-ducts have the same structure as in the dog.

In the dog, the muscular coat can be clearly demonstrated; but in respect to the human subject, on referring to the special treatises on anatomy, I was struck by the difference of opinion which exists among anatomists on this point of structure. Some affirm the existence of this muscular coat, others deny it, and I requested two of our best anatomists, Grancher and Renault, to clear up for me this question of histology. The result of their examinations was affirmative: there do exist muscular fibres in the bile-ducts of man, and if I add that this layer becomes notably hypertrophied under the influence of obstacles to the outflow of bile, we are justified in considering hepatic colic as a colic in the sense which general pathology attributes to the word. We shall see what consequences we may derive from these facts in the treatment of bilious colic. It remains to speak of the secretion of the bile and its composition.

Physiologists are far from being agreed as to the quantity of bile secreted by man. Basing himself on experimental researches, Arnold estimated the quantity in the dog as from eight to fourteen grammes per kilogramme; Nasse makes it somewhat higher, —from 12.2 to 28.4 grammes. This is about the estimate of Bidder and Schmidt, who place the amount at from thirteen to twenty-eight grammes. Köllicker and Müller put the figure at thirty-two grammes. In their more recent experiments, to which I shall shortly call your attention, Prevost and Binet fix the amount at seventeen grammes *per diem* per kilogramme of the dog's weight.

If we apply these data to man (a man, we will say, weighing sixty kilogrammes, or about one hundred and thirty pounds), we shall get the figure of one thousand to fifteen hundred grammes. At the same time, some physiologists, basing themselves on experiments made on patients with biliary fistula, affirm that this quantity does not exceed seven hundred grammes per day in a man of average weight. Others, on the contrary, affirm that the normal figure is three thousand grammes.

The flow of bile is constant, only there are circumstances which augment the secretion. First, the movements of respiration; the fall of the diaphragm in inspiration compresses the gall-bladder against the intestinal mass, and helps empty its contents into the common bile-duct. It is a veritable physiological massage of the gall-bladder. We shall see how to make applications of this fact when we come to the pathogeny and treatment of biliary lithiasis.

At meal-time, and during gastric and duodenal digestion, the flow of bile is much greater, and here nature utilizes the reserve of bile contained in the gall-bladder. A gall-bladder is, however, not indispensable. We know, in fact, that certain mammals have none. Moreover, in a man who has been

* Dujardin-Beaumetz, "Études sur le spasme des voies biliaires à propos du traitement de la colique hépatique" (*Bulletin de Thérapeutique*, 1873, t. lxxxv. p. 305).

† Audigé, "Recherches expérimentales sur le spasme des voies biliaires à propos du traitement de la colique hépatique" (*Thèse de Paris*, 1874).

deprived of his gall-bladder by a surgical operation, or by obliteration of the cystic duct by calculi, the biliary functions do not seem to be disturbed.

Many circumstances influence the secretion of bile. I have not time to enumerate them all, but the point which interests us the most in this inquiry is the action of medicines on this secretion.

You know, in fact, that there exists in therapeutics a group of medicines to which has been given the name of cholagogues. These are medicaments which augment the biliary secretion. We base the study of these medicaments on experiments which have of late assumed a great scientific precision. At first physiologists were content with examining the stools, or the liver of animals to which they had administered certain medicines; then Mosler, in 1857,* and Röhrig, in 1873,† substituted for this primitive procedure a surgical method which was much more precise. Röhrig curarized the dog; then, after having subjected him to artificial respiration, he dissected out the common bile-duct and introduced a glass tube with a tapering end, resembling a dropping tube. Then he counted the number of drops which in a given time flowed by this tube, and thus was able to form an estimate of the action of medicaments introduced into the digestive tube of animals under experimentation. Of course, Röhrig took pains to tie the cystic duct.

In 1875 Rutherford and Vignal‡ published their great work on cholagogues. The method which they adopted is very similar to that of Röhrig, only instead of making use of a rigid tube with tapering end, they introduced into the choledochus a glass tube adapted to a rubber tube which ended in another glass tube terminating in a vessel in which the bile was collected.

In 1882 appeared an important paper by Rhoman§ on cholagogues. Rhoman also experimented with biliary fistulæ, and recorded the results. Then came the articles of Baldi|| in 1883, of Pasckis¶ in 1884, and lastly the interesting publication of Prevost and Paul Binet,** on which I desire to dwell at some length.

The procedure employed by the Swiss experimenters is also that of the biliary fistula. After having anæsthetized the animal, they ligated the choledochus duct; then they established a fistula between the gall-bladder and the abdominal walls. This operation was performed on dogs, and did not compromise the health of these animals, who were under observation for several months. A glass tube was introduced into the orifice of the fistula, and the quantity of bile flowing in a given time was estimated.

Now that you are familiar with the operative procedures employed by the various experimenters, let us see what results have been obtained from the point of view of cholagogues.

In their writings, Rutherford and Vignal have made us acquainted with a series of bodies which occupy an important place in the group of cholagogue medicines. These were euonymin, phytolaccin, iridin, juglandin, baptisin, substances on which my pupil Davet wrote his thesis,†† and to which I particularly called attention in my "Clinique Thérapeutique"‡‡ (see the chapter on "Cholagogues" in "Diseases of the Liver," American edition, G. S. Davis, p. 22).

A certain number of these medicines have come into common use, and I can especially recommend euonymin, which is to-day much employed in pill form. These pills contain about two grains of the active ingredient, and are put upon the market in elegant form, sugar-coated or gelatin-coated, by the manufacturing pharmacists of the United States. One or two of these pills taken at bedtime makes quite an efficient cholagogue cathartic. Phytolaccin has also given origin to a very interesting monograph by my colleague and friend, Dr. Desnos.§§ Besides these new medicaments studied by Rutherford and Vignal, these experimenters have classed these different medicines according to their cholagogue action. We can to-day compare with the classification made by the English ex-

* Mosler, "Untersuchungen über Ubergang von Stoffen in Galle." Giessen, 1857.

† Röhrig, *Med. Jahr. Wien.*, 1873.

‡ *British Medical Journal*, October, 1875; Rutherford, *Transactions of the Royal Society of Edinburgh*, 1880, vol. xxix.

§ Rhoman, *Pflüger's Arch. Phys.*, xxix., 1882.

|| Baldi, *Archiv. Ial. Biolog.*, 1883, t. iii.

¶ Pasckis, *Wien. Med. Jahrbuch*, 1884.

** Prevost and Paul Binet, "Recherches expérimentales relatives à l'action des médicaments sur la sécrétion biliaire et leur élimination par cette sécrétion" (*Revue Médicale de la Suisse Romande*, May 20, 1888).

†† G. Davet, "De quelques cholagogues nouveaux d'origine végétale" (*Thèse de Paris*, 1880).

‡‡ Dujardin-Beaumetz ("Clinique Thérapeutique"), "Des médicaments cholagogues," t. ii., 6e édition, p. 20.

§§ *Bull. de Thèr.*, January 30, 1886.

perimenters that which results from the researches of Prevost and Paul Binet.

These experimenters have classed in four groups the different substances which they have studied. In the first group are found such as augment the biliary secretion with certainty. In the first rank are placed bile and the biliary salts; then urea, which, it must be confessed, has caused grave gastro-intestinal disturbances; then the drugs which follow: essence of turpentine and its derivatives, terpinol, terpine, chlorate of potassium, benzoate and salicylate of sodium, salol, euonymin, and muscarin.

The second group comprises medicinal substances which produce only a slight, doubtful, or inconstant augmentation, such as bicarbonate and sulphate of sodium, chloride of sodium, Carlsbad salts, propylamine, antipyrin, aloes, cathartic acid, rhubarb, hydrastis canadensis, ipecac, and boldo.

The third group contains the substances which produce a diminution of the biliary secretion: these might be called *acholagogue medicines:*

Iodide of potassium, calomel, iron and copper, atropine (subcutaneously), and strychnine in toxic doses.

Lastly, a final group is constituted by substances which have no action on the biliary secretion, such as phosphate of sodium, bromide of potassium, chloride of lithium, corrosive sublimate, arseniate of sodium, alcohol, ether, glycerin, quinine, caffeine, pilocarpine, kairin, senna, and columbo.

These results suggest numerous considerations relative to the application of these medicaments to therapeutics. Bile must be considered as one of the most powerful cholagogues. Long ago pills of ox-gall were advised for the cure of certain hepatic affections complicated with jaundice; and you will see that I have utilized the cholagogue properties of bile in associating it with oil in the treatment of biliary lithiasis.

Euonymin, which Rutherford placed at the head of cholagogues with podophyllin, still keeps its place. But the most interesting point is surely the results obtained with the salicylic combinations. This is still further a confirmation of the experiments of Rutherford, who considered the salicylate and benzoate of sodium as very powerful cholagogues. As, moreover, bile is antiseptic, you understand that this cholagogue action may have something to do with the remarkable effects obtained from salol and salicylate of bismuth in intestinal putridity.

Lastly, I may remark that terpine and terpinol, which were not known at the time of the experiments of Rutherford, may be henceforth ranked among medicines that have a marked action on the secretion of bile.

The remarks applicable to the second group—*i.e.*, that which contains substances that produce but a doubtful, slight, or inconstant augmentation of the bile—are not without importance from a therapeutic point of view. As Rutherford has already remarked, the sodium salts, and in particular the bicarbonate of sodium, are but middling cholagogues. I have already explained in my "Clinical Therapeutics" * (as also in chapter ii. of "Diseases of the Liver," Am. ed.) the contradiction which seems to exist between clinical medicine and experiments on animals in reference to this cholagogue action, or want of action, of the sodic-bicarbonate waters.

I persist in believing that it is not as a cholagogue that the waters of Carlsbad or Vichy act so efficaciously, but in modifying or in regulating the digestive functions, and in improving the general state of nutrition. I may remark that the sulphate of sodium, which Rutherford recommended as a good cholagogue, is not very reliable, according to the Swiss experimenters. It is the same with the combination of sulphate of sodium and chloride of sodium; hence the conclusion that the natural Carlsbad salt, which contains sulphate, chloride, and bicarbonate of sodium, cannot be reckoned among cholagogue agents.

With regard to aloes, I may observe that while Rutherford places it among the best cholagogues, Prevost and Binet consider it as unreliable.

Lastly, I find in these experiments a confirmation of the opinion which I expressed with regard to boldo a good many years ago (in 1876), that this medicament was rather a diuretic than a cholagogue. †

The last groups comprehend medicaments that have no action on the biliary secretion, or rather, which diminish this secretion; and this leads me to speak of calomel. Here the same discrepancies which we have remarked with reference to the alkaline waters between clinical medicine and experimental physiology again come up for explanation. If there is any one medicine which is largely in

* "Leçons de Clinique Thérapeutique," t. ii. p. 36. (See also the American translation (G. S. Davis), entitled "Diseases of the Liver," chapter "Cholagogues.")

† *Bull. de Thér.*, t. lxxxiv. pp. 165, 219, and 232.

use in hepatic affections, especially in England, it is calomel, and this favorable action has led practitioners rightly to consider calomel as one of the most powerful cholagogues.

Already Rutherford had called attention to the diminution of the secretion of bile under the influence of calomel. Prevost and Paul Binet arrived at the same result. This agreement in their experimental conclusions ought henceforth to relegate calomel to the rank of acholagogues. If it has any action in hepatic affections, it is probably by another quite different *modus operandi*. Calomel is, in fact, a very powerful antiseptic, and it may be by destroying intestinal putridity that it favorably affects the functions of the liver.

As for the coloring of the stools observed when calomel has been taken, this, according to this theory, cannot be due to modifications of the bile, but to a coloration produced by the mercurial salt itself.

If Rutherford noted that calomel diminished the secretion of bile, he was convinced, on the other hand, that corrosive sublimate augments this secretion, hence the conclusion which he deduced that it was better henceforth to substitute bichloride of mercury for calomel in the treatment of hepatic affections. If, however, we rely on the experiments of Prevost and Paul Binet, there is no warrant for this substitution, for corrosive sublimate had no cholagogue effect on their animals. With these remarks respecting the biliary secretion, I come to the last topic of my lecture to-day,—namely, the bile.

Bile has been analyzed a great many times, and you will find a summing up of several of these analyses in the table given below, which I borrow from the work of Cyr :*

I shall not take up much of your time with a consideration of all the constituent parts of the bile. I shall for the present leave to one side cholesterine, to which I propose to return in the next lecture, when I come to speak of biliary lithiasis, and I shall merely touch on the biliary salts. You know that these belong to two groups of sodium salts, —the taurocholate and glycocholate of sodium. I must here remind you that it is to these salts of sodium that the alkalinity of the bile is due, an alkalinity which is very intense, and which even renders bile in the form of ox-gall so useful in certain clothing industries. These biliary salts contain ninety per cent. of soda, and they render the small intestines, from the mouth of the ductus communis choledochus to the lower extremity of the digestive tube, an alkaline medium, so that the acid chyme as it leaves the stomach becomes neutralized in the duodenum.

The existence of this alkalinity, moreover, explains the good effects of salol in combating intestinal putridity, because this salicylate of phenol only breaks up into phenic and salicylic acids in the presence of alkalies. Lastly, I need only remind you that these salts do not exist preformed in the blood, and that they are only found in the bile.

I will dwell a little more at length on the coloring matters of the bile. This coloring matter is constituted, as you know, by bilirubin. You all know the tests which enable us to detect bilirubin in the urine. These

Table of the Composition of the Bile according to Different Authorities.

Designation.	Frerichs.		Gorup-Besanez.				Jacobsen.	Charles Robin.
	Man of 18 years; died from fall.	Man of 22 years; died from wounds.	Man of 49 years; capital execution.	Woman of 29 years; capital execution.	Man of 60 years; death resulted from fall.	Boy of 12 years; died from injury.	Human bile collected from a fistula.	Normal human bile.
Water	860.0	859.2	822.7	898.1	908.7	828.1	977.4	916 to 820
Solid principles	140.0	140.8	177.3	101.9	91.3	171.9	22.6	84 to 180
Alkaline biliary salts	72.2	91.4	107.9	56.5	.....	.....	11.8	56 to 106
Fatty matters	3.2	9.2	47.3	30.9	73.7	148.0	.15	3.20 to 31
Cholesterine	1.6	2.6	47.3	30.9	.....	.....	.56	1.62 to 2.66
Mucus and coloring matters	26.6	29.8	22.1	14.5	17.6	23.9	.56	14 to 30
Fixed salts	6.5	7.7	10.8	6.3	17.6	23.9	8.5	6 to 10

* Cyr, "Traité pratique des maladies du foie," Paris, 1887, p. 34.

tests are two in number: the first is the action of nitrous-nitric acid on the urine; it brings out a play of colors from red to green, the last only being characteristic. There are two ways of using this test: one is that of Gubler, which consists in letting a little of the acid reagent run down the side of a conical glass tube containing the urine; in the other process, which I prefer, the urine is added drop by drop to a little nitric acid contained in the test-tube.

The iodine test is also characteristic, and I am surprised not to see it oftener mentioned in the text-books. On adding a few drops of tincture of iodine to icteroid urine you obtain an emerald-green coloration which is very marked.

In doubtful cases a more complex process has been advised, which consists in precipitating the bile pigments by ammonium sulphate and redissolving the precipitate by a mixture of alcohol and chloroform, when you obtain by nitrous-nitric acid the characteristic reactions.

While the biliary salts are a product of secretion of the hepatic cell, bilirubin may be produced outside of the liver. It is obtained by modifying hæmoglobin or hæmatin by subjection to nascent hydrogen. Moreover, it is sufficient to compare the formulæ of hæmatin and bilirubin to see the numerous points of contact which these two bodies have between themselves:

$$\underset{\text{Hæmatin.}}{C_{32}H_{32}N_4O_4Fe} + 2H_2O = \underset{\text{Bilirubin.}}{C_{32}H_{36}N_4O_6} + Fe.$$

I cannot leave this question of bile pigments without speaking of urobilin, which has already come up for consideration in the lecture on the antiseptic liver. Between urobilin, bilirubin, and hæmoglobin points of contact are very numerous, and chemists have been able to obtain urobilin from hæmoglobin and bilirubin. You know that urobilin in the urine does not give with nitrous-nitric acid the reaction of Gmelin, but a mahogany-brown color; this is the characteristic of the hæmaphæic icterus of Gubler.

Numerous discussions have arisen respecting the origin of urobilin. You will find them set forth carefully and methodically in the treatise of Paul Tissier.* We have, first, the pigmentary theory, according to which urobilin comes from the resorption of effusions of blood in the tissues; thus, patients affected with cerebral hemorrhage present urobilin in the urine—or from the presence of bile pigments in the economy. We see, in fact, in the course of chronic cases of icterus, urobilin give place to bilirubin. According to the hæmatic theory, urobilin, a modification of hæmoglobin and of hæmatin, is produced outside of the liver; this is the old theory of the hæmaphæic icterus of Gubler. Lastly, the third theory says that urobilin comes exclusively from the hepatic cell, but from the cell in a morbid state. This is the theory presented by Professor Hayem and his pupil Paul Tissier. Although it is undoubtedly true that in most cases of hepatic disease urobilin is present in the urine, it is not less certain that in some lesions of the blood and in certain cases of cerebral hemorrhage we may find urobilin in the urine without any corresponding disturbance of the functions of the liver.

However this may be, when you find on spectroscopic examination the characteristic line of urobilin, you should examine the liver with the greatest care, and suspect lesions of the hepatic cell.

There has been much discussion as to whether the liver is a gland properly so called, or whether it is an organ of excretion. Between the two extreme views, the one of which affirms that the liver only separates from the blood materials that are preformed, and the other that this organ forms the bile in its entirety, there is a mixed opinion, which seems to me to conform more exactly to all the facts which we possess,—namely, that the biliary liver is both a gland proper and an organ of excretion.

A gland proper, because we find in the bile taurocholic and glycocholic acids, which do not pre-exist in the blood; an excretory organ, because, on the one hand, the coloring matters of the bile come from the coloring matter of the blood, and because, on the other hand, the bile contains toxic products.

This toxicity of the bile which remains to be examined has been well brought to light by the researches of Bouchard. Bouchard, in comparing the toxicity of the urine with the toxicity of bile, has shown the following facts: that in equal volumes, the bile is nine times more toxic than the urine; and that in equal times, the biliary secretion presents a toxicity six times greater than the urinary secretion. Hence, if it were possible for the entire biliary secretion to enter the blood, a man would be killed in eight hours, while if all the urine were to be absorbed, it would take two days and four hours.

* Paul Tissier, "Essai sur la pathologie de la sécrétion biliaire" (*Thèse de Paris*, 1889).

Of all the ingredients of the bile, it is bilirubin which appears to be the most toxic; in intravenous injections it kills in the dose of five centigrammes per kilogramme of the hare's weight. I may remark that in the experiments of Prevost and Paul Binet, when the bilirubin was introduced by the stomach, this toxicity was scarcely appreciable, and it was possible to give the animals as much as forty grammes (or more than an ounce) of bile without producing poisoning. The liver, then, like the kidney, is an organ of excretion of the toxines of the economy.

At the same time (and we have here one of the most interesting points connected with the physiology of the bile, which has been well brought to light by the recent labors of Dupré)* the bile contains no micro-organisms. Duclaux had already called attention to this fact. In the normal state, cultures made with bile, as well as the direct microscopic examination, have always failed to show any traces of bacteria, and this is a fact which *a priori* is curious when we think of the intimate relations which exist between the biliary passages and the contents of the intestine, the latter not being, as you are aware, devoid of microbes in abundance. From this absence of micro-organisms, we draw an important conclusion,—namely, that effusions of bile into the serous cavities cannot set up any inflammation when the bile is normal. Be it understood that I am speaking here of the *normal* state, for there exist, as we shall see in the next lecture, certain biliary affections where we find in the bile bacteria and streptococci, constituting what has been described under the name of *biliary infection.*

We have just seen that the bile is devoid of micro-organisms, and we have here one of the most important functions of this fluid in its relation to digestion. In order not to prolong unduly this lecture, I will pass rapidly by the part which the bile plays in the digestive process, only reminding you of the principal points.

The bile, as I have said, is an antifermentative agent; it prevents the putrefaction of substances contained in the intestines. This is so true, that when from any cause the bile ceases to flow into the duodenum, the fæcal matters lose their characteristic odor, and become excessively putrid.

The bile, moreover, is lubrifacient; it enables the alimentary bolus easily to traverse the whole extent of the intestine. Hence its suppression entails constipation.

Lastly, the bile is an alkaline substance. I have told you above that it is by reason of the salts of sodium contained in the bile that the intestinal contents are alkaline. I add that the acidity of fæcal matters deprived of bile provokes those keen and painful colics which certain jaundiced patients experience from biliary retention. Moreover, this alkalinity causes the emulsification of fatty matters, and if bile does not transform fats like the pancreatic juice, it does not render them less digestible, but certainly promotes their absorption by reason of their emulsification; hence the profound emaciation of patients affected with chronic icterus by retention seems to find here an explanation.

I have told you that the biliary liver is an organ of excretion comparable to the kidney; this comparison may be also transferred from physiology to clinical medicine, and just as we see renal insufficiency determine a grave symptomatic aggregate to which has been given the generic name of uræmia, so the suppression of the secretion of the bile, or its passage in too great quantity into the blood, brings about a clinical syndrome, to which has been given the name of *cholesteræmia*, where we witness convulsive and comatose symptoms similar to those of uræmia.

I have now finished this long chapter devoted to physiological considerations concerning the biliary liver. In the next lecture I shall inquire what conclusions we can draw therefrom from the point of view of clinical therapeutics.

* E. Dupré, "Les infections biliaires" (*Thèse de doctorat*, 1891).

THE PHYSIOLOGICAL ACTION OF OUABAÏN.

By Joseph Sailer, M.D.†

In this period of frequent discoveries in therapeutics, ouabaïn can hardly be called a recent drug, and yet, in spite of its remarkable toxic properties and powerful local anæsthetic action, it has as yet excited but little attention on the part of the medical profession.

There is a reference to a note concerning this drug, published by MM. Arnaud and Rocheburn in the *Mission Revoil* as far back as 1882; but I found this paper was impossible to obtain.

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It is next noticed in 1888, when there were read three brief papers of which it was the subject. The first of these is published in the *Comptes-Rendus dela Société de la Biologie*, and comprises a brief description of some experiments performed by MM. Henri de Varigny and Paul Langlois. They obtained the drug from some poisoned arrows, placed at their disposal by Dr. Fauriot, who had brought them from Obock, where he had procured them from the Comalis, a tribe of negroes on the eastern coast of Africa. The experimenters describe the poison as occurring in the form of a little pellet of brown material, hard and resinoid, placed just behind the barbed point with which the arrows were finished. This material they detached and dissolved in water. Injected into a guinea-pig or rabbit, in doses of from 5 to 10 milligrammes, it killed in a very short time, and until the moment of death there was no noticeable disturbance and the animal did not even appear to be ill. The phenomena, which occurred suddenly, consisted in a sort of cramp, in which the animal doubled upon itself, then lay upon its side, breathing with great difficulty, and in a few moments died with well-pronounced symptoms of asphyxia. When the thorax was opened, the auricles still beat feebly; the lungs were pale and anæmic (a condition, by the way, little in accord with the supposed asphyxiation). During life, nothing remarkable was noticed in regard to the motor or sensory functions. They further experimented on the dog and frog; but, as their results will be described in connection with my own experiments, it is needless to detail them here.

The second paper follows immediately after this, and consists of an exceedingly brief communication from MM. Gley and Lapicque. These gentlemen made use of the active principle "ouabaïn," which had been furnished them by M. Arnaud. They found that it acted upon the frog's heart very much as does strophanthin, causing arrest in systole. Upon the mammalian heart likewise it produced arrest, after a period of retardation, followed by one of acceleration. From the fact that there were respiratory disturbances, they concluded that its chief action was upon the medulla oblongata.

The third paper is published in the *Comptes-Rendus de l'Académie des Sciences* for April, 1888. It is an exhaustive study by M. Arnaud of the mode of preparation and the chemical properties of ouabaïn, the active principle of the ouabaïo wood. He obtained his raw materials from M. Revoil, and gives this account of the source of the drug: "The Comalis of the eastern coast of Africa prepare their poisoned arrows with an aqueous extract of the wood, and especially of the root of the tree ouabaïo, which grows spontaneously on the mountains of Comal. According to the investigations of MM. Franchet and Poisson, this tree belongs to the genus Carissa, of the important family Apocynaceæ; specifically it is allied to the *Carissa Schimperi*, originally from Abyssinia. Nevertheless, it differs distinctly from this by its flowers forming little serrated ridges at the summit of a common peduncle of from two to five centimetres in length." M. Arnaud now undertook to discover the active principle, and found it to be a glucoside, precipitable by tannin, and reducing Fehling's solution cold. It is unnecessary here to go into the details of the preparation of ouabaïn from the ouabaïo wood. Its properties when obtained are described as follows: "Ouabaïn crystallizes in rectangular scales, excessively thin, and of a pearly aspect. It is absolutely white, without odor and without appreciable bitterness (the wood and its aqueous solution are exceedingly bitter). It is non-nitrogenous, and has no reaction upon colored reagents, such as tournesol. It is slightly soluble in cold water; 100 c.c. of this liquid, at 11° C., hold in solution .650 gramme ouabaïn. It is very soluble in boiling water, and these solutions have a great tendency to become supersaturated. Its best solvent is alcohol moderately concentrated; 100 c.c. of eighty-five per cent. alcohol, at 11° C., hold in solution 3.75 grammes of ouabaïn; with heat this solubility is much increased. It is insoluble in chloroform, in anhydrous ether, and practically in absolute alcohol. Ouabaïn does not liquefy easily; about 180° C. it becomes pasty, becoming brown, and discharging bubbles of gas; about 200° C. it becomes completely fused. Obtained by crystallization from water, it is hydrated; it does not completely lose its water of crystallization until about 130° C. Dried thus, there is found great difficulty in weighing it, as it readily absorbs moisture from the air without becoming deliquescent. Ouabaïn is broken up under the prolonged influence of acids, with ebullition, giving rise to a reducing sugar; it is, therefore, a glucoside. Like many of its compounds, it has an action upon polarized light. I have found

$$[\infty]D = -34^\circ$$

for a solution in cold water."

The elementary analysis yielded the following results:

$$C_{30}H_{46}O_{12} + 7H_2O.$$

In a subsequent paper upon "the elementary composition of strophanthin, crystallized extract of (the) *Strophanthus Kombé*," M. Arnaud makes this interesting statement: "Strophanthin ($C_{31}H_{48}O_{12}$) presents, therefore, an elementary composition that makes it the immediately superior homologue of ouabaïn ($C_{30}H_{46}O_{12}$). These two substances, so closely related, appear to present a common nucleus in their constitution. Perhaps it is the same for a whole series of cardiac poisons, as a whole, but little studied." It is interesting, in view of this last suggestion, to note that, for the *Apocynum cannabinum*, Lauder Brunton states that "in small doses it is laxative, in large doses emetic and cathartic. Apocynin and apocyneïn act on the heart as cardiac tonics, like digitalis, and are also diuretic." Statements, it will be found, that in some respects recall ouabaïn.

Concerning the physiological action of ouabaïn but little has been written, and this little represents the results of a few hasty experiments rather than of any thorough investigation. Of the virulence of the drug there can be no question. MM. Varigny and Langlois speak of the brevity of time that elapses between the injection of the poison and death, and of the suddenness with which the symptoms of death manifest themselves. MM. Gley and Rondeau content themselves with saying that it is extremely violent. I performed two experiments upon dogs in which the animals merely received a hypodermic injection and were permitted to go at liberty. These were made to determine the general action.

For the first experiment a dog weighing eight kilos was selected. The day was in the latter part of June and unusually warm. The details are as follows:

A.M.

10.57 .005 gramme ouabaïn injected into the thigh.

11.00 The dog appeared anxious; it was noted that he moved his lower jaw up and down in a peculiar rhythmical manner, and that he perpetually licked his chops; there was much saliva in the mouth.

11.04 He was panting strongly, but the gait was steady, and there was apparently no loss of co-ordination.

11.07 It is noted that he is dozing.

11.31 He now seemed to be restless and again panting.

11.51 He was trembling, and this was a tremor of the muscles and not a twitching of the skin.

P.M.

12.05 He vomited copiously; the vomit was frothy and of a greenish tinge; he now appeared to be somewhat exhausted.

12.12 Again he vomited, but this time the vomit was scanty, yet still almost pure mucus colored with bile. He retched continuously and with great effort, and seemed to suffer considerably; he was now extremely exhausted. The vomiting and retching were continuous from this time to the end, accompanied by progressive weakness.

12.22 There was involuntary micturition; the animal was lying prone; his mouth and throat appeared to be full of the frothy green vomit, which he was too feeble, apparently, to eject.

12.24 There was great muscular relaxation, the dog being seemingly paralyzed, the only movement being the occasional feeble respirations and the almost continuous but very feeble efforts to vomit. The mucus now filling the mouth and throat must have interfered seriously with respiration.

12.25 There was involuntary defecation. Immediately after this the dog appeared to be dead. The thoracic and abdominal cavities were at once opened. Peristalsis was observed to be intense. The ventricles were arrested in diastole; the auricles still vibrated rapidly, but ceased before the section was completed. The ventricles still responded to mechanical stimuli (pinching and pricking). The blood in the heart was of a dark color, and, as was to have been expected, quite fluid. The lungs were pale; before the pleuræ were pierced a few respiratory efforts had been made.

In considering this experiment it is obvious that the slight symptoms noted in the stage preceding vomiting, with perhaps the exception of the salivation, were due to the heat. To produce emesis, the drug necessarily acted centrally, and the large amount of mucus indicated that the secretory fibres to the gastric glands, probably the peripheral vagi, were stimulated. The green color was almost certainly due to bile. Involuntary defecation and micturition occurred in this instance late in the poisoning; they may have been due to paralysis of the sphincters, or the violence of the peristalsis and spasmodic contraction of the bladder. The peristaltic movements noticed when the abdomen was opened might, indeed, have been due to the stimulus of the air, but the air was not cold and the activity of the peristalsis was almost too great to admit of this explanation. As the auricles and ventricles were affected differently, there would seem to be reason for believing that the intracardiac ganglia were affected, rather than the heart-muscle; but it will soon be evident that this also is powerfully acted up-

Throughout the whole experiment there were not the slightest signs of the asphyxia which MM. Langlois and Lapicque declare to be so pronounced, nor was there in any experiment I ever performed with ouabaïn, the slightest evidence that death was due to anything but syncope. Indeed, in every instance, in the case of kymographic studies, did respiration persist after the needle had commenced to trace the straight line of cardiac arrest. The lungs were pale, and this I found to be the case in every experiment, including those of MM. Langlois and Lapicque; and although it would be difficult in this instance to say whether the heart or breathing had ceased first, it is noteworthy that respiration persisted until the thorax had been opened and the lungs collapsed. The dark color of the blood is no proof, in the absence of other, that asphyxia had occurred.

For the second experiment a dog weighing nine kilos was selected. This experiment was performed in the early part of December, on a cold day, the temperature of the laboratory being about 65° F. The rectal temperature of the subject was ascertained to be 39.8° C.

P.M.

12.30 An aqueous solution containing .010 gramme of ouabaïn was injected into the tissues of the thigh, and the dog tied to the leg of a table.

12.37 He appeared weak and his motions were sluggish.

12.50 Rectal temperature 39.8° C. He appeared still somewhat weak, and was quiet while the thermometer was being inserted. It was noticed that, when he was placed upon the floor, his station was slightly unsteady.

1.10 He was now licking his chops, but appeared to be so well and lively that it was predicted that the dose was too small, and that the experiment would fail.

1.20 The dog suddenly gave a sharp cry, and immediately appeared to be seized with a species of delirium, in which he sprang from side to side, striking against the table to which he was tied, all the time uttering sharp, short, high-pitched cries. During the acme of this attack he defecated, but appeared utterly oblivious of the act. In a few moments he fell exhausted upon his side. When his tail was pinched he cried out.

1.25 He had now arisen, and stood motionless, with legs far apart, head thrust forward, and eyes fixed on vacancy, panting from his recent exertions and seemingly unconscious of all surroundings. His fore-paw was lifted and bent backward, so that its dorsal surface rested upon the floor, but he made no effort to restore it to its natural position. His tail was pinched sharply, but he seemed to feel it not; yet he steadily, almost automatically, resisted efforts to bring his feet together when his eyes were covered. In a few minutes he lay down again.

P.M.

1.30 He vomited for the first time, being at the same time seized with a delirium similar to the first, in which he sprang from side to side, tugging at his rope, giving vent continuously to cries, and seeming to suffer acutely; but this attack was even briefer than the first, and again he fell upon his side, making continual efforts to vomit, and bringing up ever the same greenish frothy mucus. The respirations had now become very slow, and I feel confident that the mass of mucus and air filling the mouth and nostrils must have acted as a serious mechanical hinderance to respiratory action. The heart could not be felt. The respirations became more and more infrequent, and were accompanied by a peculiar gasp in expiration.

1.35 Temperature 39.6° C. The dog is now moribund. There was yet a slight tremor, a stiffening of the muscles, and "the totality of the forces that resist death" had been overcome by a portion of white powder scarcely sufficient to cover the point of a penknife-blade.

1.45 Thoracic section disclosed the heart arrested in diastole. The lungs were pale. The strongest induced current produced no effect upon the heart-muscle stripped of pericardium, but caused vigorous contraction in the adjacent intercostal muscle.

In this experiment, as in the preceding, the slight preliminary symptoms were no more remarkable than can be observed in any dog tied to a table-leg for half an hour. The first obvious conclusion is, that ouabaïn does not (or rather did not in this instance) affect temperature, there being just before death, after repeated emesis, a fall of .2° C., a result that may be considered to be perfectly natural. The delirious attack may be explained by ascribing it either to direct action upon the cerebrum (and that the drug does act upon this organ is indicated by some phenomena of the death-agony) or (and I think the character of the attack renders this more probable) to the effect of intense pain. Believing in its primary stimulant effect upon unstripped muscle, I can easily conceive of an intense cramp-like contraction of the intestinal walls; and the act of defecation, occurring when it did, lends probability to this view, if we consider it to be the result of violent peristalsis acting upon matter contained in the lower bowel. It is noteworthy that the fæces were dry and well formed. Tactile sensation and pain were clearly lost in one stage. This was certainly not due to paralysis of the receptive centres, for that the dog had good coördination was shown by the persistent maintenance of the feet separated even when the eyes were closed, and this phenomenon probably excludes spinal involvement. But the

exact point involved can be best studied in the section on the action upon the nervous system. The vomit was of the same frothy, mucous character; and again, of course, was necessarily of centric origin; and, as before, vomiting was accompanied apparently by considerable pain. In this case a longer interval was allowed to intervene between death and the opening of the thorax. All cardiac movement had ceased, and the heart-muscle was paralyzed absolutely. The action upon the voluntary muscles was not marked.

Injected into the subcutaneous tissue of a frog, ouabaïn produces death in from one-half to two hours, varying according to the dose, according to the size of the frog, and sometimes apparently inexplicably. In the following account of the symptoms manifested, I shall adhere to no particular case, but shall endeavor to give a general view of all the results that were obtained in the numerous experiments upon these animals. It is not to be supposed that all these symptoms occurred in any one instance, but they happened sufficiently often to establish the fact that they are the results of the drug and not mere accidental phenomena.

The first marked effect is the production of rapid swallowing movements, usually noticed in from two to eight minutes. After this the lower jaw is slightly dropped, and the frog, instead of maintaining its normal inclined position, sinks down flat upon its belly. This, however, may not occur for some time, but is not delayed more than thirty minutes, and usually occurs within fifteen. During this period, and at intervals throughout the case, there may occur peculiar gasping movements, in which the mouth is opened wide and the tongue protruded, exactly as if the frog were trying to vomit. After the period of feebleness, it is noticed that the frog neither feels pain acutely nor responds vigorously to the ordinary stimuli of reflex action. This condition increases in intensity, until finally the frog, apparently paralyzed, is insensible alike to pricks or pressure upon a joint; yet a powerful induced current passed through the body or a limb will often produce unmistakable movements of escape, and often, while lying supine and seemingly insensible, the animal, by a sudden spring, will fling himself from the operating-board to the floor; or—and this is more frequently the case—will commence to swim vigorously. To my mind these swimming movements are a conclusive demonstration of absolute cutaneous anæsthesia, so absolute that the frog does not even appreciate the nature of the medium by which he is surrounded. Frequently during the stage of paralysis muscular tremors were observed. Death usually occurred almost imperceptibly, but in one instance there was a marked spasm. After death the heart was found, in every instance but one, arrested in systole,—that is, the ventricles were hard and white, and the auricles distended and turgid with blood. Invariably the lungs were found to be enormously distended. Even in those frogs whose spinal cord had been cut just below the medulla, and the thorax then laid open to expose the heart, during the whole course of the experiment, the lung could be observed filling and slowly forcing its base downward until the heart was fairly crowded out of the thoracic cavity. It may be noted that the gall-bladder was always overfull.

It now remains, before taking up in detail the action of ouabaïn upon the different systems of the body, to consider the somewhat scanty literature of the general action of the drug, and note the points of difference from and agreement with the points just presented.

The communication of MM. Varigny and Langlois has already been alluded to. It forms almost the sole source from which to quote. Using—and this is noteworthy—the rabbit, they found that there were no symptoms of importance for the first few minutes. Then there was a cramp, in which the animal doubled upon itself, followed by convulsive movements, and then a period of exhaustion, during which the animal lay upon its side. They maintain that they noted respiration to be very difficult and death to supervene with the most pronounced symptoms of dyspnœa, yet at the autopsy the lungs were found to be pale, the ventricles immovable, and the auricles still pulsating feebly. The most obvious difference between their results and my own is the entire absence of vomiting; but the structure of the rabbit's stomach renders it very difficult for this animal to regurgitate, so that much more powerful emetics are required to produce emesis than upon the dog, who vomits with the greatest ease. The next point is the apparent importance of the respiratory symptoms; but I have already been presumptuous enough to impugn the accuracy of these observations. Doubtless violent, albeit unsuccessful, retching would produce a certain amount of disturbance in respiration and the appearance of dyspnœa; but the non-congestion of the lungs would negative this idea, unless indeed it were cramp asphyxia, and it will be apparent, when the ner-

muscular system is considered, that there is no condition at any period in the poisoning that would render the occurrence of cramp asphyxia either likely or possible. Evidently the stage of anæsthesia either did not occur or was not observed, as was perhaps the case in my first experiment, and the latter can be accounted for by supposing it to be due either to the brief duration of the condition or to its occurrence during the stage of exhaustion. The gentlemen, indeed, state that there was "during life nothing particular on the side of sensibility or motility;" but in regard to motility this certainly cannot be true of the convulsive stage. The points of agreement are sufficiently pronounced to render it likely that drugs having the same or approximately the same physiological action were employed in each case. There was the same sudden seizure and convulsive movements, followed by exhaustion, and evidently the result of either cerebral action or intense pain; then the progressive loss of power, until death ensued. The description of the contents of the thorax is identical with that found in my first experiment, and would probably apply equally well to the second had section been made immediately after the fatal moment.

So far as I can learn, there is no other published account of experiments made to determine the general action of ouabaïn. MM. Gley and Rondeau inform us that it is an "extremely violent poison;" and M. Arnaud, that, injected subcutaneously or intravenously, it rapidly induces death, acting chiefly upon the heart, but they give nothing further. Concerning its action upon frogs, the only notice I have found is that of MM. Gley and Rondeau, who state that, injected subcutaneously, it rapidly induces death by arresting the heart in systole, acting in the same manner as does strophanthin.

Before leaving the subject of the general action of ouabaïn, it will be interesting to quote an experiment of M. Gley, made with the aqueous extract of strophanthus hispidus. It was performed in March, upon a terrier weighing twelve kilos.

P.M.	
2.31	.04 gramme injected into the right paw.
2.40	The animal appears restless. Respiration difficult; efforts at vomiting.
2.42	Emesis.
2.43	Retching; the dog responds very well to calls and caresses; intelligence and sensibility perfectly preserved.
2.46	Some inco-ordination.
2.49	Vomiting of mucus.
2.51	Violent efforts to vomit; vomiting.
2.52	The dog is erect; motionless; the tail towards the right; the head low; respiration infrequent and slow; very severe dyspnœa.
2.53	The animal falls; very brief tetanic attack; defecation; micturition; a cry; the pulse is imperceptible. The thorax is immediately opened, and the heart found arrested in a state of semi-contraction.

This, indeed, recalls ouabaïn.

Perhaps the most interesting portion of the study of the physiological action of ouabaïn is that which considers its action upon the circulation. From the studies of its general action it is obvious that it is its effect upon this function, and especially its effect upon the heart, that renders it so fatal to vertebrate life. There is, therefore, a double reason for considering this organ first; it is the most natural beginning of the circulation and the part most powerfully affected.

When a solution of ouabaïn (a strength of 1 to 1000 was usually employed) is dropped upon the exposed heart of a frog whose spinal cord has been cut, there occurs in a very few minutes a slight diminution in the rate of cardiac movement. The following experiment may be taken as a type of several. The frog was prepared in the usual manner.

Time. m. s.	
.00	Two or three drops of a solution of ouabaïn were dropped upon the exposed heart.
5.00	Rate, 62 per minute; impulse more forcible; there was, perhaps, a slight slowing.
8.00	Rate, 60; impulse still exaggerated.
10.00	Rate, 40; impulse markedly more forcible.
13.00	Rate, 24; impulse markedly more forcible.
14.00	Heart stopped in systole. The auricles stopped with the ventricles.

To any one acquainted with the almost indefinite continuance of pulsation of the frog's heart exposed *in situ*, it will at once be evident that this slowing and final arrest must be due to some extraordinary influence, and it is perfectly legitimate to ascribe it to the drug. As this slowing occurred, the heart seemed, as is noticed in the notes of the experiment, to beat more vigorously, becoming very white in systole, and very red, perhaps, by contrast, in diastole. The retardation appeared to be due rather to prolongation of the systole than of the diastole, and as this effect continued and became more marked, the systole finally became indefinitely prolonged,—that is, the heart ceased to pulsate, and the extreme whiteness of the muscle testified to the vigor of the contraction.

As a rule, the auricle does not share imme-

diately in this arrest, but continues to pulsate for a few minutes, and when, finally, it also stops, it is much distended with blood. Ultimately the ventricle relaxes, but this does not occur until the other muscles of the body cease

periments upon normal dogs, the following results were obtained. The numbers given equal the number of beats occurring in ten seconds; the rate per minute can readily be obtained by multiplying by six.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.
Dog's weight..	18	15½	15	9	8	22	9	8	11	17½	7
m. s.											
.00.....	19	...	...	...	32	34	36	29	...	19	38
.00.....	19	27	38	27	31	34	36	29	37	17	38
	.003	.005	.0015	.003	.0025	.002	.0025	.005	.005	.003	.001
.10.....	19	25	37	26	30	34	36	28	33	20	37
.20.....	17	22	37	19	30	35	...	26	28	17	35
.30.....	15	20	36	14	26	34	...	14	20	14	35
	.003										
.40.....	17	18	36	12	26	33	29	9	12	14	34
1.00.....	14	...	...	12	19	32	14	21	12	17	26
					.0025						
1.10.....	15	...	32	13	15	32	13	19	14	19	25

to respond to electric stimuli. Decapitation of the frog—*i.e.*, section of all the cardiac nerves—does not appear to hasten this reaction. Indeed, the spasm of the ventricle would appear to be due solely to the action of the drug upon the cardiac muscle. If injected hypodermically, exactly the same results occur, only more slowly. In but one instance, out of many experiments, the heart stopped in diastole.

Upon mammals, ouabaïn produces effects quite distinct from this account. The dog was used exclusively. The drug, in aqueous solution, was injected into the external jugular vein. The record was obtained by a needle, governed by a continuous body of liquid, in a series of tubes connected with the carotid artery, the final liquid being mercury, contained in a U-shaped tube, and bearing upon its free surface a float, to which the needle was attached. This needle wrote upon a moving sheet of smoked paper, and just below the tracing the time was marked in seconds.

A typical tracing of the dog's pulse under the influence of a moderate dose presents the following features: Almost immediately after the drug is injected there begins a steady rise of pressure. At the same time the heart-beat becomes less frequent but more forcible. This continues for two or three minutes, when there occurs a sudden increase in the blood-pressure, accompanied by great quickening of the rate and loss of power of the individual beats. In about a minute there is an equally sudden fall of pressure and the heart ceases to pulsate.

Considering first the effect upon the heart, the first point noticeable is the slowing. This was always well marked within thirty seconds after the injection. Thus, in a series of ex-

This series, taken in order as they were performed, show how constant was this result. There is, however, enough variation to require analysis in a few cases. But it is necessary to state that, owing to the coarseness of the scales provided in the laboratory, the dose may not in all instances be accurately given, although, after a little time, experience enabled me to prepare the quantity with considerable exactness. Another source of error lay in the insolubility of the drug. Boiling water was always used, having been found superior to warm alcohol for the purpose of intravenous injection. But when large doses were employed, this did not always dissolve the whole quantity. Then, again, there was apt to be some slight precipitation when the water became cool enough to permit it to be injected, in either case giving rise to varying strength of the different injections made in the same animal, with the probability that the later ones were the stronger. Thus, although much care was employed, it is likely that the minute quantities employed are not always correctly given. The error, I am confident, is, nevertheless, inconsiderable, and in nowise affects the results, as far as the physiological action of ouabaïn is concerned. It does affect, however, the accuracy of the calculation of the fatal dose per kilogramme of body-weight, and impairs somewhat the therapeutic deductions.

In VI. the reduction is least marked. The dog was very large, twenty-two kilos, and the dose, therefore, proportionately small; yet, even in this case, there occurred a perceptible lessening in the rate, and this is much more apparent after a second dose. Thus the count gives—

m. s.	Per min.
1.10.....	192

m. s.	.002	Per min.
1.20		192
2.00		168
3.00		150

In III. the conditions were much the same. The dog weighed fifteen kilos, the dose being therefore .0000001 of the body-weight. As in VI., the full action of the drug was in time developed; in this instance without the employment of a second dose. Thus—

m. s.	Per min.
1.10	192
2.00	156
3.00	168

In VII. the loss of count was due to the slipping of the belt controlling the paper-roll. This dog was quite small, and the greater effect and rapidity of the drug's action is well pronounced.

It is to be noted that, as the slowing continued, there was often an extreme dicrotism of the sphygmogram. This was, indeed, so marked in some cases as almost to exclude the idea that it was due to the recoil of the blood from the semilunar valves; and indeed I believe that in many cases it was the result of the extreme irritability of the heart-muscle and attempts at systole that remained imperfect. The diminution in frequency of the heart's beat continues until a minimum is reached. At this point there is a temporary steadiness, and then, as a rule, but not uniformly, a sudden and considerable increase in the rate occurs, invariably accompanied by a great change in the character of the cardiogram. Coincident with the slowing, there had occurred an increase in the strength of the systolic contraction, shown both by the increasing blood-pressure and by the increase in the magnitude of the excursion of the needle. But now, although the blood-pressure reaches a yet higher point, the movement of the needle produced by the heart's action is much less; less, indeed, it seems to me, than would be accounted for by the increased rapidity of the rate, and possibly indicating some deficiency in muscular power. The sudden change in rate is well shown in the following experiments.

In I., at one minute and thirty seconds, the pulse-rate had reached 66 per minute. The drum was now stopped for thirty seconds. The record from this point ls as follows:

m. s.	Per min.
2.00	218
2.10	240
2.20	240
2.30	234

These numbers are twice the rate noted before administration and almost treble those of the lowest point reached.

As this action was by no means always well marked, and as it several times, as occurred in the experiment just given, took place quite unexpectedly, while the drum was stopped when the heart's action had apparently become steady at the reduced rate, it will not be expedient to take the various experiments in their order, but rather those in which the sudden acceleration is well pronounced, and afterwards those in which it is with more difficulty susceptible of demonstration.

In IV. there is found the following record:

m. s.	Per min.
1.10	78
1.20	78
1.30	186
2.00	216
2.30	252

In V. the dose was repeated at the end of one minute; two minutes later the rate had fallen to 66. The drum was now stopped for seventy seconds; when again started, the cardiogram gave the following count:

m. s.	Per min.
4.20	234
4.30	276
4.40	282

In X., at the end of one minute, the rate was 102. It now slowly increased, until at the end of two minutes it was 162. From this point it was as follows:

m. s.	Per min.
2.10	240
2.30	252
3.00	258

In VIII. I find the following figures:

m. s.	Per min.
1.50	144
2.00	168
2.10	186
2.20	...

At this point the heart was beating very rapidly, but so feebly that it was impossible to count the separate beats. It is likely that the massive dose employed (.0006 gramme per kilo of body-weight) paralyzed the cardiac muscle before there was time for the other effects to become fully pronounced.

In IX. the same conditions existed, the dose being .005 in a dog weighing eleven kilos. The record gives—

m. s.	Per min.
1.30	128
1.40	144
1.50	156

steadily and somewhat rapidly rising; but just at this point the dog was seized with a violent clonic spasm, which continued until just before his death, and shook all the apparatus so much that further counting was impossible. What changes may have occurred in this period can only be conjectured, but it may be noted that towards its latter part, in those few places where the character of the pulse could be determined, it was seen to be of the shallow and apparently rapid character of the second stage, and the blood-pressure showed the characteristic rise.

It is well, however, to study those cases in which this action is even less well shown, in order to see whether they prove it, by negative evidence, to be merely an occasional result, or if even here there is some trace of its occurrence.

VI. may be wholly disregarded, as, owing to the lack of time and the limitations of the apparatus, it was not completed, and the dog was killed with chloroform before the first stage had passed.

In II. a large dose was employed (.005 gramme for fifteen and a half kilos), and the cardiac action was so irregular that it was exceedingly difficult to count the beats. This irregularity partook of the nature of imperfect and prolonged systoles, and was due apparently to excessive stimulation of the ventricular muscle. Nevertheless, at one minute and thirty seconds the rate was 84; from this point it markedly increased, at the same time becoming quite shallow; thus—

m. s.	Per min.	
1.40	132	
1.50	150	
2.00	126	
2.10	156;	stopped 15 seconds.

As the rate continues to increase it is not unlikely that it reaches a still higher point during the stoppage. At any rate, increase in frequency is demonstrated, accompanied by shallowness of the pulse-wave, rise of pressure, and increase of the respiratory rate, although the figures relating to these points will be considered further on. Whether the irregularity was due to the large dose or to an idiosyncrasy of the dog it is impossible to say.

In III. an opposite cause can be conjectured (.0015 gramme for fifteen kilos). From a rate before injection of 225, the pulse had sunk, by two minutes and thirty seconds, to 150; at five minutes the dog was evidently recovering from the ether and struggling violently. .003 gramme of ouabaïn was now injected, and at five minutes and fifty seconds the rate had increased to 228, at six minutes and thirty seconds it was 234, and throughout this period of the typical shallow character with rise of pressure, so that the effect became pronounced as soon as enough of the poison had been employed.

In VII. the drug acted very rapidly, although the dose (.0025 gramme for nine kilos) was not excessive. At one minute and forty seconds the rate had fallen from 216 to only 90. As the heart was apparently beating steadily at that point, the drum was stopped for twenty-five seconds. When again started, although respiration continued, the heart had stopped beating. I think that this furnishes evidence of neither kind, for while it is not unlikely that an increase in the cardiac rate occurred during the stoppage, it is, of course, impossible to prove it.

There now remains but the final stage of the action of ouabaïn upon the heart,—that of complete paralysis. This occurs suddenly. When the cardiac rate of the second stage has reached its height, and remained steady for a few seconds, a sudden and rapid decrease in the rate occurs, and in less than half a minute the ventricles have become motionless. It seems established that the auricles continue to act for a brief space of time; then they, too, cease to pulsate, and the muscle rapidly dies, and within five minutes is absolutely unresponsive to the strongest secondary currents. Blood-pressure falls with the pulse-rate, but does not reach the zero-point until a few seconds later. Respiration persists, often for more than a minute. Unfortunately, as in the beginning of the second, the suddenness of the occurrence of the last stage frequently prevented it from being recorded upon the smoked surface. It cannot, in consequence, be shown in every experiment, although the fact that it must have occurred within a brief period can be readily inferred. Nevertheless, there are enough instances remaining to exhibit clearly its character.

In I. the highest point was reached at two minutes and thirty seconds. The rate was then 240. From this point the record is:

m. s.	Per min.
2.40	234
2.50	174
3.00	0

In III. the record is:

m. s.	Per min.
5.50	222
6.30	228
7.00	216
7.10	0

In IV. the record is:

m. s.	Per min.
2.50	252
3.30	222
3.40	0

In V. the highest point was reached at four minutes and forty seconds; the rate was then 282. The drum was now stopped for forty-three seconds; when again started, cardiac movements had ceased.

In I. C (X.) the record is:

m. s.	Per min.
2.50	258
3.00	210
3.10	144
3.20	0

In VIII. it is:

m. s.	Per min.	
2.10	186	
2.20	?	fluttering, feeble.
2.30	0	

In several other experiments the change was either lost, as in Experiment V., or the heart's action was so feeble and irregular just before death that the rate was uncountable. It is, I think, sufficiently shown that the arrest was sudden.

It is now time to see if the cause or causes of this action upon the heart can be elucidated. As the primary arrest occurs in the isolated frog's heart, it is undoubtedly due, at least in part, to the direct action of the drug upon the cardiac muscle. Considering the phenomena exhibited by the frog's heart, I believe it is a stimulating action, whereby the strength of the beat is increased and the systole prolonged. That the strength of the beat is increased would appear manifest from the tracings taken from the dog. Thus, in V., the perpendicular of the needle before the drug was employed was two millimetres; at one minute and fifty seconds it had increased to fifteen millimetres, and at two minutes and thirty seconds to twenty-five millimetres. As the rate had decreased from 190 to 51, it will be evident that the increase cannot be explained as the simple result of the slowing. On the other hand, I cannot believe that the disproportion is wholly due to increased cardiac force, for there was undoubtedly in this case, one of the most extreme, great relaxation of the vessel walls. Contrary to the general rule, blood-pressure sank considerably, and it was noted that the chief element in the decline of the mean was the lowering of the minimum-point, thus indicating distention of the arteries during ventricular diastole. Nevertheless, it is inconceivable that the ordinary systolic contraction could have produced such a wide excursion. And there are not lacking cases in which blood-pressure was rather increased than reduced. Thus, in VII., the normal excursion of the needle equalled 1.5 millimetres, yet at one minute and ten seconds it had increased to thirteen millimetres, and blood pressure was still at its maximum. But in VIII. may again be noticed the fall in minimum pressure when the pulse-wave was lengthened out. Thus from a normal of two millimetres the magnitude of the excursion rose to four millimetres, with increasing pressure; and then, suddenly, to ten millimetres, with a fall, especially marked in the minimum measurement. And XIX. (IX. A) presents the same features. From a movement of one millimetre before administration, the needles passed over twenty-two millimetres at fifty seconds; and, although the maximum point had risen markedly, so great was the fall in the minimum that the mean was really lower. Now, although these figures demonstrate very clearly the relaxation of the vessel walls, they also demonstrate, I take it, quite as well the increasing force of the heart, which is able, in spite of the yielding of the living tube by which the force is in part transmitted to the column of mercury, to propel the needle to as high a point as usual.

But to return to the pulse-rate. Perhaps the first explanation that would suggest itself to a physiologist, to account for the slowing of the heart's action, would be stimulation of the cardiac inhibitory mechanism. Fortunately it is easily tested. In I. B both pneumogastrics were severed, and an interval of several minutes allowed, in order that the animal might recover from the shock. In order to facilitate breathing, a canula was inserted into the larynx. The dose was moderate (.002 gramme in ten kilos), and all the conditions apparently favorable. The record reads as follows:

m. s.	Per min.
.00	210
.002 gramme.	
.10	210
.40	222
1.10	258
1.30	252
.002 gramme.	
1.40	240
2.00	0

It is to be remarked that the increase was absolutely progressive until a few seconds before the final arrest, when a slight lessening occurred. As in every experiment with this drug when the vagi were uncut, there was primary slowing of the heart, and as it totally failed to occur in this case, it seems clear to me that some portion of the cardio-inhibitory apparatus is stimulated by the drug. The other experiments, in which the pneumogastrics were divided, are not so conclusive; still, when carefully analyzed, these also give evidence pointing in the same direction. Thus, in II. B, immediately after the injection, the pulse fell very slightly, becoming dicrotic, and finally the systoles were so irregular that it was impossible to count them accurately. It seems, indeed, upon the tracing, as if systole followed upon systole in such rapid succession that there was no time for the irritated heart-muscle to relax itself between them, as if the stimulation of the drug (and a large dose was employed in this case,—.005 gramme in fifteen kilos) was so great that there was immediate danger of cramp syncope, while the urgent calls of the system for more blood were stopped short at the central ends of the divided vagi. But this effect soon passed, and then the rate increased; but not by any sudden acceleration, as in the normal dogs, but by a slow, gradual climb; and when a second large dose was thrown in, the heart no longer felt the poison, and the slow increase continued uninterrupted. A few selected periods illustrate the character of the case:

m. s.	Per min.	
.00	186	
.005 gramme.		
.10	180	
.30	174	
.50	?	too irregular to be counted.
1.30	162	
2.00	168	
.005 gramme.		
2.30	174	
3.00	?	
3.10	0	

Towards the last the tracing becomes a mere line, in which at certain points a slight tremulousness may be noted, not distinct enough to count, but enough to show that the ventricles were still fluttering. III. B gives quite an unsatisfactory record, if the series be taken to demonstrate the stimulation of the cardiac inhibitory apparatus; but I have no desire to substantiate any preconceived idea in relation to the drug. Unfortunately, or perhaps fortunately, the experimental work is so scanty that there is no satisfactory, nor even moderately complete, account of the action of ouabaïn, so that I can obtain no hints as to what to look for, nor can I check my results, when obtained, by the results of others. Nevertheless, when the tracing of this experiment is examined critically, unfavorable as it would seem at first, I cannot but believe that it rather sustains than destroys the conclusions drawn from the two preceding. In the first place, the dog was profoundly affected by the operation. Naturally all the results obtained from such experiments as these are colored by the unnatural conditions to which the animals are subjected. It is no trifling, in the human subject, to ligate the common carotid; and in the dog we must believe that there is likewise great disturbance of the centres at the base of the brain, as a result of the sudden alteration in the condition of the channels by which they are supplied with blood. Now, added to this, consider the cutting of both vagi, which, it must be remembered, are afferent as well as efferent nerves, and even admitting that the motor impulses from the bulb are not disturbed, it must be evident that the equilibrium of the centres is considerably impaired, and this impaired condition will, of necessity, be reflected by the organism, since the great efferent tracts of the cord and all the spinal nerves are still intact. It is not unlikely, then, that submitting a series of dogs to these conditions, and collating the tracings, there would be many differences to be observed among them, even although no other disturbing element had been introduced. Under these circumstances, then, the only method by which reliable results could be obtained, would be to take two large series of dogs, cut the vagi in each, and to one series administer the drug, leaving the other series undisturbed. Conclusions deducted from a study of the differences of these two series would be of value. Unfortunately for such an elaborate research, I had not the time, especially as ouabaïn presented many interesting features to be worked out for the other systems. These experiments, however, in default of better, are not without value.

To return to III. B. In the first place, the tracing, previous to the injection of the drug, shows decided irregularities, not only in the character of the beats, but especially in the rate. On the whole, there is a progressive slowing of the latter feature. After the drug was injected, the slowing continued, to

ıcceeded by a stage of decided irregularity, lower than the preinjection rate, but slightly ıore rapid than the earlier slowing. The ecord gives:

m. s.	Per min.	
.00	276	
.10	258	
.002 gramme.		
.10	246	
.40	192	evidence of imperfect systoles.
1.00	216	
.002 gramme.		
1.10	198	
1.30	246	
1.50	192	
2.00	0	

Although the magnitude of the cardio-ram increased from three millimetres to five ıillimetres, there was none of the long stop ıetween systoles typical of the normal tracing, or was there, at any time, the rapid shallow racing of the third stage. Indeed, the varia-ion of the tracing, outside of the irregulari-ies, is not so marked as the count would in-icate. Certainly the curve is very different :om those obtained from the normal dog, and his of itself would indicate a considerable in-uence on the part of the cardio-inhibitory pparatus. Moreover, at forty seconds, when ıe slowest point was reached, there was again, s in Experiment I., evidence of imperfect ystoles, as if from over-irritation of the heart-ıuscle. Although the magnitude of the car-iogram increased, still the increase was in-gnificant, quite different from the long xcursion of twenty-five millimetres, which ccurred in many of the normal experi-ıents. The fact that the drop did not occur easily explained when it is observed that ıe pulse-rate never fell as low as three per econd, and that hence there was not enough ıterval between the systoles to permit of the ng drop that occurred in the others.

IV. B fully confirms the induction of the ction of the drug upon the cardio-inhibitory pparatus. The record is:

m. s.	Per min.
.00	180
.005 gramme.	
.10	180
.50	186
1.20	168
1.50	156
2.10	0

It is perfectly obvious that there was not ı this case any primary slowing, for the re-ırdation is very slight and throughout progressive. There was no typical second stage, and although the strength of the beat was at first increased and afterwards diminished, there is no sudden alteration in its character, nor is the pulse characteristic of the tracing taken from the normal dog.

(To be continued.)

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*A CASE OF SLOW PULSE.**

By D. W. Prentiss, M.D., Washington, D. C.

WITH THE REPORT OF THE AUTOPSY.

By Robert T. Edes, M.D., Washington, D. C.

THIS report is to complete the case of "Slow Pulse," previously read before the Association of American Physicians, and which was published in the Proceedings of the Association of American Physicians in 1889 and 1890 †

The members may remember that the patient was brought before them for examination, both last year and the year before.

He has since died, and this statement, with the report of the autopsy by Dr. Edes, completes the case.

This man, aged 53 years, had a pulse ranging from 11 per minute to 40 per minute for over two years, being subject to frequent attacks of syncope.

No disease of heart or other organs could be discovered.

The following is the record since last report (May, 1890):

	P.	T.	
May 20, 1890.	...	...	Became worse; dizzy.
May 24, 1890.	13	97°	Fainting spells almost constant; tightness across chest; no pain; bromide of ammonia; stimulants; morphine and atropine as necessary.
May 26, 1890.	14	...	Only slight spells.
May 30, 1890.	18	...	Only slight spells.
June 10, 1890.	34	100°	Great many spells; has fallen twice, once cutting his head.
June 12, 1890.	15	...	
June 14, 1890.	16	...	Pulse irregular; diarrhœa.
June 19, 1890.	16	...	Few spells; fell.
June 29, 1890.	21	...	More or less delirious for several days.

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* Read before the Association of American Physicians, September 25, 1889.

† Published in the Therapeutic Gazette, December 16, 1889.

	P.	T.	
July 2, 1890.	15	...	Delirious; restless; wanders about house; afraid of being killed.
July 4, 1890.	...	...	Died at 6 P.M.

Had been more delirious and excited than usual; thought several persons were trying to kill him.

Rushed about the house, screaming in terror murder, fire, etc., until the neighborhood was aroused.

Was finally induced to lie down, and seemed quiet.

His wife left him for a few moments, and on returning found him dead.

Autopsy was made by Dr. Edes, and will be reported by him.

AUTOPSY, SEVENTEEN HOURS AFTER DEATH.

Expression tranquil. Body tolerably well nourished; considerable fat under the skin and in cavities. Very little hypostatic congestion. Blood everywhere dark and fluid, except a few small, loose, black clots.

Lungs posteriorly moderately congested, crepitant. No fluid in pleuræ, pericardium, or peritoneum.

Heart rather large and firm. Lungs being well dilated, it is probable that no more than the normal surface of the heart came in contact with the thoracic wall. Neither the aorta nor the coronary arteries were atheromatous.

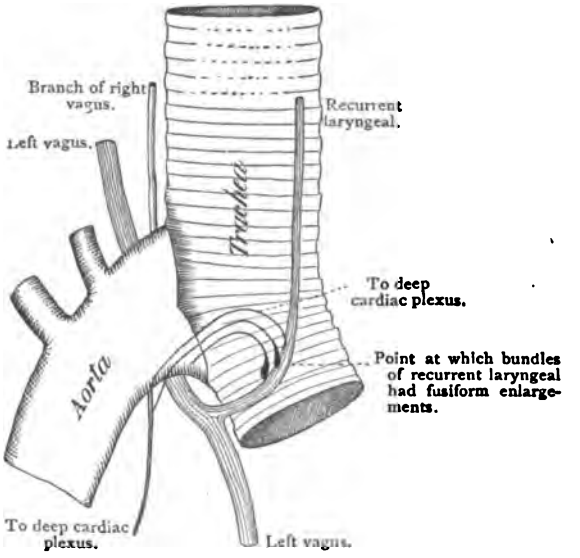
Stomach normal; intestines not opened.

Spleen moderately firm, medium size.

Kidneys congested, capsules not adherent. No atrophy. Healthy.

Brain and upper portion of spinal cord healthy to gross appearance. On the right side, the upper cervical ganglion of the sympathetic, the lower cervical ganglion, a portion of the thoracic sympathetic, a portion of the splanchnic at semilunar ganglion were removed. On the left side, the same portions, except the upper ganglion and the thoracic sympathetic. All these appeared normal to the naked eye.

On dissection of the heart, the left pneumogastric appeared normal until the region was reached where it bends under the arch of the aorta to give off the recurrent laryngeal. Here several of the strands appeared somewhat less clearly defined through the surrounding connective tissue, which at this point was more strongly adherent.



Aorta lifted up to loop of recurrent laryngeal.

There were fusiform enlargements of the several cords. One of these was on a cord going downward to form the œsophageal plexus; others were on the bend of the recurrent laryngeal just below the artery. At this point the recurrent laryngeal gives off branches which connect with the cardiac plexuses.

The muscular substance of the heart was firm and not fatty. Walls of both ventricles thickened, those of the right perhaps more in proportion to its usual thickness. (See diagram.)

The various portions of the nervous system above mentioned were examined microscopically after hardening in osmic acid.

The fusiform enlargements at the point of paration of the cardiac branches from the current laryngeal were so much dragged ion and injured in the process of dissection at the microscopic examination was en- ely unsatisfactory and disclosed nothing. he other cords and ganglia, including por- ons of the cardiac plexuses, showed no in- ease of connective tissue nor any atrophy her of nerve-fibres or ganglionic cells.

The intrinsic cardiac ganglia I failed to id.

Sections of the medulla were made and ained. Here also the hardening had not en entirely successful, but fortunately the ctions at the level of the pneumogastric icleus were sufficiently good to show that ere was no lesion at this suspected point. ie most that could be said of the medulla, a whole, was that it appeared to be con- sted.

I am much indebted to Dr. Gray, of the my Medical Museum, for sections of the per part of the medulla oblongata.

EMOVAL OF STEEL FROM THE EYE-BALL, AND SUGGESTING THE USE OF MAGNETIZED INSTRUMENTS.

By Frank Fisher, M.D.,* Philadelphia, Pa.

N September 8, 1891, B. A., an elec- trician, aged 27, presented himself to as a patient at the Wills Hospital. He ted that on the 5th, while taking machinery art, something had flown into his left eye. There is considerable injection, especially in ciliary region, of the conjunctiva, and a all wound to the inner side of the cornea. discoloration of the iris, but immediately the nasal side, about one millimetre from pupillary edge, a small round hole with gged edges. The lens showing marked iæ of opacity. Use of a mydriatic reveals oint of attachment between the pupillary rgin of the rent and the anterior capsule, erwise an evenly-dilated pupil. A wound the anterior capsule can be seen directly der the hole in the iris. From this wound, tending through the lens, outward, back- rd, and downward, is a narrow tract of acity. The lens is swollen and so opaque t no details of the fundus can be de- ibed, but with the eye turned strongly wnward and outward, a small mass, pre- ting slightly quadrangular surface, can be discerned, well to the temporal side. It yields a faint metallic lustre, and is apparently in the anterior portion of the vitreous, with its greatest length coincident with the tract of greatest opacity in the lens. No doubt this is a foreign body, and from the fact of Mr. A. being engaged with a chisel and hammer at the time of injury, doubtless it is a fragment of steel from one of these tools."

With the eye in the same position, this mass can be fairly well seen by good daylight.

The patient complains of no pain, but of rapidly-decreasing vision.

All risks—of allowing the foreign body to remain and of attempting its removal—were clearly set before the patient. He elected the attempt at removal, which I at once undertook, assisted by the resident physician, Dr. M W. Zimmerman. Hoping the foreign body might still be engaged in the posterior capsule, or even far enough forward in the vitreous to be included with the lens in a spoon, it was determined to remove the lens before making further effort, and a Critchett spoon was selected for the purpose.

A free linear incision was made and iridectomy upward. After clearing the anterior chamber of hemorrhage, which was profuse from the iris, a curved magnet-point was introduced, brought into contact with the anterior capsule directly over the location of the foreign body without showing the slightest influence upon it. The magnet was next thrust gently into the opening in the anterior capsule, through which the foreign body had entered, but still without influencing it.

The capsule was freely lacerated above, and the spoon introduced behind the lens and slowly passed downward deep enough to clear the lens. The hope of removal by this means was now dispelled, for though there seemed but lightest contact between the spoon and the mass, it rapidly vanished in front of and under the lip of the spoon. All the lens that could be embraced in the spoon was removed. No metallic lustre or mass was now visible in the former position, but a bare suspicion of lustre seemed reflected from the extreme lower anterior part of the ball, as if from something resting upon the ciliary body. The point of the magnet was again carefully and slowly introduced, with the fortunate result of at once securing the fragment of steel from the suspected locality.

The eye was then cleansed and bandaged, but a very small quantity of vitreous having been lost during the operation.

* Visiting Surgeon to the Wills Eye Hospital.

The fragment is of steel, 2.50 millimetres by 1 millimetre, of irregular thickness, the greatest being .50 millimetre. Its weight barely one centigramme.

The patient has had no untoward symptom. Dressings were discontinued on the fourth day, and a shade worn since. At this date, September 18, the eye is quiet; the conjunctiva almost clear; the wound of incision firmly healed. A small central portion of the pupil is perfectly clear; some lens substance in the anterior chamber is rapidly undergoing solution; tension is normal; and vision $\frac{2}{6}\frac{0}{0}$, unassisted by a glass. He is allowed to leave the hospital, continuing the use of a solution of atropine, two grains to the ounce, twice daily.

Having seen procedures similar to this adopted a number of times without success, and having knowledge of cases, the counterpart of this of mine, in which the identical methods of operation were pursued and in which the foreign bodies were lost in the same manner but not recovered, naturally gave rise to considerable thought.

And simply to adapt to new uses the form of instruments we already have, I suggest making spoons, loops, and hooks of steel, which shall be very mildly tempered, and not too highly polished. Furnish each instrument with a screw-head for attachment to the core of an induction coil, so that it can be highly magnetized while in use.

This suggestion is made with the double hope of expediting the removal from the eyeball of such fragments of iron and steel as are visible to the naked eye, and consequently easily located,* and of obviating the troubles and dangers of prolonged searching for foreign bodies which become lost to view while attempting their removal, or which are actually displaced and lost by instruments in use by reason of inability to magnetize them.

It is my belief that had I used a magnetized spoon of the character suggested in the case B. A., the fragment of steel would have been withdrawn at the same time as the lens and without further disturbance to the contents of the ball.

It will be argued that the suggested instruments are unwieldy and more difficult of use because of the necessary attachment of coils and wires. Even with disadvantages in their use, there may be much time, anxiety, and suffering saved, if they facilitate the immediate removal from the eye of such foreign substances as can be held by a magnet.

In pursuance of this idea, Messrs. J. H. Gemrig & Son are making for me, and for use at the Wills Hospital, a spoon of the Critchett pattern, but a trifle wider. It will be of steel and malleable, except the bowl. The bowl, 11 millimetres long, 5.50 millimetres wide; the shaft, 1 millimetre in diameter for 13 millimetres of its length, then rapidly increasing in diameter for another 11 millimetres of its length, where the diameter will be 8 or 8.50 millimetres, making a total length from the head of the shaft to the tip of the spoon of 35 millimetres. Above and continuous with the head will be a screw about 8 millimetres in diameter for attaching it to the core of a coil. A shaft-head of less size would probably not become sufficiently magnetized to overcome the resistance of the smaller portion of the shaft.

1832 Arch Street.

* Probably as high as twenty per cent. of foreign bodies within the eyeball can be located with the naked eye when seen at once after injury.

LARYNGEAL DIPHTHERIA AND ITS TREATMENT.

By A. J. Rosenberry, M.D., Wausau, Wis.

THE treatment of uncomplicated diphtheria of the pharynx is confessedly unsatisfactory because unsuccessful. Diphtheria causes more deaths in the State of Wisconsin than any other single disease. Sudden cardiac paralysis is a constant menace to the patient from and even before local manifestations of the disease have appeared until several weeks after the disappearance of the false membrane. It can scarcely be doubted that the treatment by the free use of alcoholic stimulants, with the frequent administration of a concentrated form of the tr. ferri chloridi, as advised by Dr. Simon Baruch, of New York City, is the best treatment; but upon this treatment alone the vast majority of cases of laryngeal diphtheria will terminate in death.

Loomis gives the mortality under ordinary methods of treatment as ninety-five per cent. All authors agree that it is among the most fatal diseases we are called upon to treat. With the hope of securing better results, I have adopted a method of treatment, which, in five successive cases, has proven successful.

The first case was that of E. R., 4 years of age, a boy. He was attacked by croup, accompanied by fever and rapid pulse, on Sunday, April 7, 1889. I first saw the child on

Monday, April 8, at which time the diagnosis of laryngeal obstruction from the presence of false membrane was apparent. There was complete loss of voice; the respirations were labored, and so noisy as to be easily heard at twenty feet. An unfavorable prognosis was given, and the following treatment adopted: Full doses of tincture of iron, with small doses of chlorate of potassium, every two hours. Quinine sulphate, one grain, every two hours. Whiskey, from two to four teaspoonfuls, every hour. Sulphur was insufflated every two hours; and what I regard as the essential part of the treatment was the use every half-hour by a good steam atomizer of this formula:

℞ Ol. eucalypti,
Ol. terebinth., āā ʒi;
Ol. vaselini, ʒvi. M.
Sig.—Use in atomizer every half-hour.

For about forty-eight hours there was no improvement; but, on the other hand, the breathing was no worse. After forty-eight hours there was slow but progressive improvement, and in one week from the beginning of the treatment the child began to recover his voice. I made the last visit on April 19, eleven days after the first visit, at which time the little fellow was about the house and was able to dispose of his usual rations.

Was called on April 12, 1889, to H. Le P., 5 years of age, also a boy. The symptoms were much the same. There was complete loss of voice, breathing was labored and sibilant, cough croupy, and the usual sounds of laryngeal obstruction were present, but in not so marked a degree as in the former case, so that the diagnosis in this case is open to question. The treatment was the same as in previous case, with much more rapid improvement, so that the case was discharged in four days.

October 24, 1889, I was called to Mabel E., aged 9 years, with laryngeal obstruction very pronounced. There was entire loss of voice; pulse was 140; respiration hurried and sibilant, so that it was easily heard in next room; temperature was 103°. Diagnosis of laryngeal diphtheria, with most unfavorable prognosis, was made. Treatment modified to suit age was adopted, the atomizer being used every half-hour. Once in two hours a mild solution of carbolic acid, glycerin, and water was used in atomizer. Improvement was decided within twenty four hours. Temperature came down to normal; pulse also became nearly normal. The case progressed satisfactorily, and was discharged cured five days after I was called.

On October 31, 1889, I was called to Mary H., aged 9 years, cousin of the last patient. Pharyngeal diphtheria was present, as an inspection of the throat showed. Pulse was 54 and extremely irregular. Similar treatment was instituted. Two days after I was called laryngeal diphtheria appeared, and for five days the case appeared hopeless, but eventually the voice began to reappear, pulse became more regular and rapid, varying between 70 and 90; and on Saturday, November 9, 1889, the patient was discharged, not entirely well, but there was then rapid and steady improvement, since which time the case has gone on to complete recovery.

I cannot believe that these four successive recoveries were accidental. The diagnosis was unquestionable in Cases I., III., and IV., and with the usual mortality there would have been at least two deaths. Of course further trial is necessary to establish the value of the eucalyptol and turpentine spray. When first used the spray is offensively strong, but patients soon become accustomed to it and learn to like it.

On January 17, 1890, I was called to a girl, 8 years of age, daughter of a Lutheran minister, who had been visited several days previous by another physician, and the diagnosis of tonsillitis was made. At my first visit there was false membrane on the posterior wall of the pharynx and also on the tonsils. There was complete aphonia, sibilant respiration, with all the usual symptoms of laryngeal diphtheria; rapid, weak pulse and high temperature were present; the same treatment as that given above, with recovery. This case could not well be regarded as other than hopeless, and for forty-eight hours there was no improvement apparent. After that time improvement was gradual and continued, and my last visit was made on January 23, six days after my first visit.

A CASE OF TRAUMATIC TETANUS SUCCESSFULLY TREATED WITH CHLORAL AND CALABAR BEAN.

By A. Radcliffe, M.D., Waukegau, Ill.

THE following case of traumatic tetanus, which occurred in my practice in 1887, is of interest on account of the long time the illness lasted, its favorable termination, and

the enormous amount of chloral and fresh fluid extract of calabar bean which was administered.

Willie, aged 10 years, ran a splinter of wood in the top of his foot on August 14; it festered, and came out on the 21st. On August 24, complained of stiffness in back; jaws stiff; could not eat. He was brought home. I saw him August 25, when the foot had healed. There was no soreness, but risus sardonicus was present. He was only able to open his mouth a little, but could walk about his room. Being slow in developing, I thought it safe to give some hopes of recovery. Put him in dark room, quiet place; would not have ears plugged. Put him on chloral, 7 grains every hour; fluid extract calabar bean, 4 drops every two hours.

The stiffness increased, jaws locked, nostrils widely expanded, brows corrugated, severe pain at pit of stomach, some stiffness of limbs at first, which in a day or two increased to a rigidity as if frozen; the forearms did not at any time become stiff. Abdomen was as stiff as a board; remained so even after the jaws relaxed some. Contractions, at the worst, were every fifteen to twenty minutes, the least noise exciting them; muscles of the neck would then stand out like taut ropes under a loose canvas. During contractions, opisthotonos; rested on back of head and heels; cried to be lifted up to take the strain off from neck.

August 30.—Some relaxation during sleep.

September 1.—Some relaxation when awake; contractions lighter, not so often; yawns frequent, jaws being stiff; took liquid food through teeth.

September 2.—Thunder-shower and a fire in town during the night made him worse. He often called for an enema; did this morning; we had to give it; the necessary handling seemed to worry him. Contractions continued all day; more frequent than ever; had slight opisthotonos; was as rigid as if frozen. By raising one foot, while under chloroform, the whole body came up like a log. Chloroform was given freely; chloral, 9 grains every hour, in milk, dropped on teeth; had to drop carefully, so as not to bring on a contraction; the calabar bean, 7 drops, every two hours. Urine passed towards morning was high-colored, 1030 specific gravity, from which I got half a teaspoonful of urate crystals, square yellowish plates, and long, colorless needles, in bunches resembling a sheaf of wheat.

September 3.—Better; few contractions; took food.

September 4.—Could protrude tongue; took glass of milk in own hand. His condition was changeable, though gradually improved.

September 30.—Pulse irregular; many scaly pimples on legs; finger-nails rough; thought it came from the chloral, so stopped it. The least thing that crossed him brought on a contraction. If he wanted a drink, it was impossible to get it quick enough. He would say, "Don't fret me; come quick!" and then have a contraction. When it went off, he would take the drink or whatever he had called for. The same in feeding him. Gave very little morphine, as it caused constipation. It was a task to take care of him without chloral. He had taken so much chloroform, we thought best to withhold it; gave him as little as possible.

By October 6 he could open his mouth; protruded his tongue carefully, for his jaws often closed suddenly, and if his tongue was caught, it brought on a general contraction. He sat up a little; abdomen quite rigid.

October 16.—Went out to dinner.

He had taken chloral, in 7- to 9-grain doses, for five weeks; large part of the time every two hours, missing an occasional dose. He could not take a larger dose, as it required too much liquid to destroy the burning sensation. Did not try enema, as he objected to it. The fluid extract of calabar bean was given, in doses of 4 to 7 drops, though not as regularly as the chloral. Medicine given most of the time in milk.

All the family, boy himself, declare he lengthened out at least two inches while sick, and proved it by his pants, two or three pairs, which were too short; they were long enough when he was taken sick.

AN EARLY SYMPTOM OF WHOOPING-COUGH.

Dr. Huguin, of Tourteron, affirms (*Union Méd. du Nord Est*, May, 1891) that photophobia with dilatation of the pupil is a useful diagnostic symptom of whooping-cough in the early stage, before the cough has become characteristic. He cites three cases in support of this opinion,—two of the patients were children and one an adult,—and in all of them the symptom referred to preceded any other manifestation of the disease.—*British Medical Journal*, September 26, 1891.

The Therapeutic Gazette

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Leading Articles.

RATIONAL MEDICATION.

THE doctrine that disease is dependent on certain fixed physical conditions, or, in other words, is under law, may be said to be peculiar to this century. The same may be said of the kindred doctrine of the self-limited nature of acute diseases. Those whose memories go back forty-five or more years will not forget the sensation which pervaded medical circles in this country when these views, to which were annexed certain corollaries as to the impotence of medicinal agents in materially changing or controlling morbid processes, were first promulgated by Dr. Jacob Bigelow and others.

It had been held from time immemorial that medicine was the art of curing disease. "A far more just definition," said Dr. Bigelow, "would be that medicine is the art of understanding diseases, and of curing and relieving them when possible. If this definition were accepted, and its truth generally understood by the profession and the public, a weight of superfluous responsibility on one side and of dissatisfaction on the other would be lifted from the shoulders of both." This writer, while recognizing the fact that a few diseases (as malaria) are at once curable by medical means, also points out that others (as pneumonia) are self-limited,—incurable now by art, yet susceptible of recovery under natural processes both with and without the interference of art. He also taught, in his "Rational Medicine" and in his lectures, that the safe conduct of the sick consists much more in cautionary guidance than in active interference. Patients sometimes suffer from neglect, but more frequently from ill-judged and meddlesome attention.

It is not necessary that we should show that a simultaneous mental movement of a similar kind was going on in England, in France, and in Germany, and Dr. Bigelow—subsequently also Dr. B. E. Cotting—in this country only voiced what leading minds in the medical profession in those countries (and particularly in Germany) were saying just as plainly and just as emphatically. Nor is it necessary that we should prove that such views are now everywhere regarded as basic truths, underlying rational practice. Recognizing the fact that every acute disease has a definite evolution, and that its course cannot be cut short by medicine (unless, indeed, through knowledge of the causal agent and the means of antidoting and destroying it), the best men in the profession realize that a judicious expectancy and a *laissez-faire* policy is better than a blind interference. Causal indications are met wherever this is practicable; it is sometimes quite possible in the onset of septic infections to clear out a putrid focus, and thus jugulate a formidable disease. The wonderful progress which is being made in the pathogeny of infectious diseases certainly warrants the hope that the physician will not always find himself powerless to check the progress of even typhoid fever and pneumonia.

In one department of therapeutic study striking advances have certainly been made; we allude to the knowledge of the actions of medicines in raising or depressing the vital properties of organs and tissues. We know that digitalis has both the one and the other of these actions on the heart-muscle; that certain doses raise cardiac activity; that certain doses depress it. We need but allude, in passing, to the advantages of utilizing the cardiac tonic properties of this drug in cases of enfeeblement of the heart-muscle. The facts which have been acquired relative to the vaso-dilator properties of nitroglycerin inspire us with confidence in the remedial properties

of this drug in cases which we may designate as capillary anæmia, where vascular tension is high and the heart labors in vain to fill the arterioles; instance the dyspnœa of interstitial nephritis, where experience every day testifies to the benefits of this medicament.

If we are not able yet to answer, with entire satisfaction, the question proposed to Molière's undergraduate, "*Pourquoi l'opium, fait il dormir?*" we certainly can do better than simply ascribe a "*virtus dormitiva*," for we know the actions on living protoplasm of the alkaloids of opium, and their effects on the intracranial circulation and the sensory motor centres.

We may say the same with regard to the effect of strychnine in exalting the sensory function of the cord, or the effect of the bromides in depressing reflex excitability, and the utilization of this knowledge in combating certain nervous affections.

The specific action of ergot in increasing the irritability and promoting the contraction of the unstriped muscular fibre will always render this a valuable agent in hemorrhages; and as a parturifacient.

The remarkable property of jaborandi in promoting the action of the perspiratory glands renders this the most speedy and certain of diaphoretics.

Among other positive acquisitions to medicine, and in the direction of exact science, we may mention the discovery of anæsthetics and of cocaine, and the utility of general and local anæsthesia for the relief of pain in medicine and surgery; also the discovery of the benefits of hypodermic medication and of the new hypnotics, chloral, sulphonal, etc.

Within the past seven years many new antipyretics have been introduced into the materia medica; most of these (as antipyrin, acetanilid, phenacetin) are also invaluable analgesics, and as such are employed by all practitioners.

Professor Nothnagel, in a recent address delivered before the Association of German Naturalists and Physicians, declares "that the aim of medicine really consists in averting premature death, and in removing or mitigating the effects and consequences of disease;" and he adds, that "since the enunciation of Lister's immortal principle and the practice based on it, and the cognate work of Pasteur and Koch, it would be folly to assert that there are any limits to the art of healing, since the prospects of still greater gains in the future are so great."

To conclude, a wider knowledge of morbid processes and a larger observation of clinical facts has put under the ban the antiphlogistic medication and the unreasonable polypharmacy once in vogue. Practitioners are learning to make a more judicious use of a few remedies which have stood the test of experience. Nor are we altogether indebted to homœopathy for the lesson (learned through centuries of painful groping in the dark) that disease is governed by laws of its own which are largely subordinate to the conditions which regulate life. The force of vital resistance is so great that all our remedies seem to have but a minimum (though real) influence in forwarding the natural tendencies towards recovery. It is quite possible to treat disease successfully with very little medicine. Better by far to give no medicine than to combat a disease of which one is ignorant with medicines of which he is even more ignorant! But this century has done much to dispel this ignorance (once so justly the reproach of medicine), and we may hope that greater and more beneficent discussions are before us.

A NEW BORON PREPARATION.

AN examination of medical literature will reveal very contradictory opinions as to the antiseptic value of boric acid, first so strongly recommended by Lister. In this, as in many other questions where marked divergence of opinion occurs, the explanation of want of success will often be found not in the remedy itself, but in the manner in which it is employed, and the determination of the conditions which indicate its employment. With the idea that perhaps this explanation might apply to the question of the antiseptic value of boric acid, Dr. Jaenicke has undertaken a number of culture experiments which go largely to settle the antiseptic value of this body, his results being published in the *Therapeutische Monatshefte* for September, 1891. His experiments first dealt with the sterilizing power of boric acid, and showed that it was so slight that, for practical purposes, it might be entirely overlooked. For since he found that boric acid might remain in contact for days and weeks at a time with various microorganisms without interfering with their activity, it could scarcely be supposed that the mere washing of the surgeon's hands in a four per cent. solution would serve to destroy the various germs which might be even below the epidermis.

On the other hand, the author found th

while boric acid could not be regarded of value as a sterilizer, it nevertheless markedly interfered with the development of various micro-organisms, especially retarding the development of their various toxines, tox-albumens, etc., only two and a half per cent. being required to accomplish this result. The author believes that this property of retarding the development of micro-organisms may be of practical therapeutic value as a local application to wounds. Theoretically, while these views are undoubtedly correct, it is yet evident that washing the wounds with a four per cent. solution of boric acid, even although performed many times daily, would not succeed in accomplishing the desired results. The small amount of boric acid solution which remains in the wound would rapidly disappear through absorption. Local application of antiseptic gauze made by soaking it in hot saturated boric acid solution (about twenty-five per cent.) accomplishes the desired result much better. For the undissolved crystals which become deposited in the mass of the gauze as the solution cools gradually become dissolved as the boric acid is absorbed by the tissues, provided, of course, evaporation be prevented. The great objection, however, which applies to the use of boric acid, is its comparative insolubility, since the application of the undissolved powder in wounds which form but slight amount of secretion may cause direct injury from excessive irritation.

Dr. Jaenicke believes, however, that he has found a boric acid derivative, which, with the same degree of antiseptic power, possesses greater degree of solubility. This substance is formed by the union of equal parts of boric acid and borax at the boiling temperature, and presents scarcely any differences in its antiseptic and pharmacological properties from boric acid. It, however, has a neutral reaction, forms hard crystals, which dissolve at the ordinary temperature to form sixteen per cent. solution; at the temperature of the body, thirty per cent. solution; and at the boiling temperature, over seventy per cent. When the hot saturated solutions are rapidly cooled, precipitation does not at once occur, so that such over-saturated solutions may be used for local applications, as, for example, in the middle ear.

It would appear that, since the cold-saturated solution of this substance contains four times as much antiseptic matter as the cold-saturated solution of boric acid, it is consequently four times as active.

The author states that this substance, which is readily made by heating equal parts of boric acid, borax, and water to the boiling-point, has proved of great service to him in a number of cases, especially in the treatment of suppurative affections of the ear, employing sixteen per cent. solution of the crystals which deposit from the above mixture when allowed to cool.

NIHILISM IN THERAPEUTICS.

THE true nihilism in therapeutics is not the abstaining from active interference and from dosing where there is no plain indication for drugs, but the proscription of all drugs, as is exemplified in the teachings of certain hygienists, who, in their revolt against the irrational therapeutics of a former age, have gone to the extreme. Thus, one of these medical guides of the present day,* who certainly wields a vigorous pen, and occasionally discourses in the *Popular Science Monthly* for our pleasure if not for our edification, has been instructing the readers of that journal how to treat fevers, asthma, nervous maladies, catarrh, pleurisy, croup, etc.

This writer ascribes malaria to "inability of the vital powers to withstand the influence of moist heat from within and from without" (*sic*). The remedy is "either flight to a colder climate or adopting a less calorific regimen." Among the agencies of a calorific regimen is the evaporation of ice-water, or even of common cistern-water, in the room of the patient. "Get a wheelbarrowful of unglazed bricks, that can be procured at any pottery, put them close together on the floor, and sprinkle them from time to time with cold water." So much for the positive aspects of the treatment of fever and ague.

On the negative side, we are told never to give cinchona bark. "Quinine," he says, "sticks to the system like mercury, and I doubt if there is such a thing as perfect recovery from the effects of its protracted use. Strychnine, bitter orange-peel, valeriana, arsenic, and snake-root are equally objectionable, and often produce after-effects that are ascribed to other causes, or to a lingering nervousness induced by the fever itself."

We doubt whether any practitioner of any considerable experience in treating malarial fevers can be induced seriously and patiently to read this indictment, in which bitter orange-

* Dr. Felix J. Oswald.

peel, snake-root, and valerian come in with quinine and arsenic for a share in the sweeping condemnation. If he makes any remark, it will be that classic exclamation of Mr. Burchell in the "Vicar of Wakefield,"—"Fudge!"

Under the head of spasmodic asthma, we are told that cold water ranks first among the palliatives. "A plunge-bath into a pond (or tub) of water of a sufficiently low temperature to produce a gasp and a shiver rarely fails to break the spell of the suffocating stricture." So much for the positive side. We fancy ourselves witnessing the attempt to apply this advice to actual practice, at least, in the case of certain aged, infirm, and delicate patients who are victims of this disease. On the negative side we have vigorous denunciations of the "asthma weeds." "Stramonium is as virulent as belladonna, and the smoking of the leaves produces vertigo, heart-spasms, and violent headaches." "It does relieve asthma on the principle that diseases yield to more serious diseases."

It is only necessary to ask the reader to notice the exaggerations of statement in the foregoing paragraph. Writers of this stamp are always reckless and inexact in their assertions, and this particular writer's assumption of knowledge and his oracular manner are especially imposing.

When we come to the subject of pleurisy, we are told that "pleurisy, or the congestion of the pleural membrane, is generally an inflammatory complication of a chronic catarrh" (*sic*). Croup "is an obstruction of the air-passages induced by the lethargic influence of overfeeding, and warm, impure air" (!). It will be seen that this medical authority excels in *definition*, and that there is a special propriety that articles of this kind should have the wide publicity that has been accorded to them in a journal which is the exponent of popular science! The reader is reminded of how "an overloaded stomach reacts on the functions of the respiratory organs," as "many adults have had an opportunity to experience in the strangling sensations of a nightmare." We are told, too, that "the respiratory stimulus of the cool night-air generally helps to overcome such affections, especially if the sufferer can ease his lungs by a contraction of his arms or by turning over on his side."

"Spasmodic croup generally occurs after the establishment of a plethoric diathesis, after persistent overfeeding has turned a baby into a mass of fat and fretful sickliness."

We pass by more of this sort, and the severe arraignment of bleeding, narcotics, etc., to consider some of the "Remedies of Nature" in another number of the same journal. For the production of anæsthesia sufficient for surgical purposes, we are advised to try "rapid breathing." "Persons who object to the use of chloroform (perhaps from an instinctive dread that in their case the ether slumber [*sic*] might prove a sleep that knows no waking) can benumb their nerves during the progress of a surgical operation by *gasping as deeply and as rapidly as possible.*" We are cautioned against the administration of chloroform, which "often produces distressing after-effects,—nausea and sick headaches that sometimes continue for days together," and even result fatally.

As remedies for "dropsy" (causes not specified), we are told to resort to "mountain air, a light but nourishing diet, and strict abstinence from alcoholic stimulants."

Under the head of "Emetics," we are counselled to rely on "tepid water;" in urgent cases we are to "add a little white mustard-seed, and 'tickle the fauces' with the wing-feather of a pigeon."

Excessive vomiting, we are assured, can be checked "by stimulating applications to the pit of the stomach and the extremities."

Epilepsy "results more frequently from sexual excesses than from all other causes combined" (!). "Remedies: strict continence and out-door exercise" (!). "Excessive heat should be carefully guarded against, as well as all exciting passions."

For fainting fits, or syncope, "cold water applied to the neck, the feet, and the palms of the hands is the best restorative."

Under the head of "Febrile Affections," we are again told that "refrigeration is better than any medicine." For heart-burn or cardialgia, the "remedies" are "fasting and passive exercise, a ride in a jolting cart [!], and kneading the abdomen."

The melancholic patient is urged to try "altruism, the open air, a sunny climate, and the company of children and optimists!"

In the treatment of insomnia, we are told that under *no* circumstances should hypnotic medicines be resorted to.

"An opium torpor cannot fulfil the functions of refreshing sleep; we might as well benumb the patient by a whack on the skull."

For jaundice (kinds and causes not specified), no medicines are to be given; we have only these remedies at our command: "out-

door sports, combined with as much fun and sunshine as possible."

We really feel that we ought to apologize to the readers of the THERAPEUTIC GAZETTE for having devoted so much space to a notice of writings which may seem to them too absurd for serious refutation. Our only object in calling attention to these articles—of which the public has certainly had a surfeit—is the prominence that has been given to them in a professedly scientific journal, and the fact that the didactic part of these writings (they have recently, we believe, been gathered into a book) constitutes a type of what may be regarded as the real "therapeutic nihilism" of the day.

Reports on Therapeutic Progress.

THE SUPPOSED CURATIVE EFFECT OF OPERATIONS, PER SE.

Under this title PROFESSOR J. WILLIAM WHITE, of Philadelphia, contributes a paper to the *Annals of Surgery* for August, 1891, which, not only from its subject, but from the great number of authorities quoted, and from the peculiarly rich experience of the writer, makes an article of unusual interest and importance to both surgeon and physician. The author's attention was first directed to this subject by reason of his experience with the operation of trephining for so-called traumatic epilepsy.

During the past five years, with Dr. D. Hayes Agnew, he has trephined in fifteen cases of supposed traumatic epilepsy. All but one recovered from the operation. The patient who perished was an imbecile and a confirmed drunkard, as well as an epileptic. Death occurred from suppression of urine, probably secondary to etherization.

In one case a bullet was found embedded in the brain substance; in another an irregular portion of the internal table was dissected out from beneath the dura mater, to which it was attached by cicatricial adhesions. In another there were projecting spicules of bone on the internal surface of the button removed and the adjacent portions of the skull. In two, marked sclerosis and thickening of the cranium were observed about the field of operation. In the remaining cases nothing abnormal was seen. Although this was the case, they were without exception markedly improved by trephining; in two instances even to the point of apparent cure, no return of symptoms having been observed for eighteen months and for two years after the operation. In the other seven the results were strikingly favorable, convulsions disappearing for weeks or months, although previously of more than daily occurrence.

The author has, in so far as this is possible, classified the cases in which operation *per se* seemed to be the main factor in bringing about a cure. These cases are divided into three groups, in accordance with the anatomical seat of the symptoms or of the supposed disease. This brings them under the following heads:

1. Operations for the relief of nervous phenomena, as epilepsy, insanity, paralysis, etc.

2. Operations for abdominal and pelvic disorders, as peritonitis, tumors, etc.

3. Miscellaneous operations.

This classification is further carried out by grouping together (*a*) those cases in which nothing whatever was found explanatory of the symptoms; (*b*) those in which some departure from normal conditions was observed, but was so slight as to be apparently inadequate to explain the symptoms; (*c*) those cases in which an apparently grave and irremediable condition was disclosed by an exploratory operation, but notably improved or altogether disappeared after more inspection and handling, no further surgical interference having been thought justifiable.

Under the heading of "Operations for the Relief of Nervous Phenomena," Dr. White has tabulated, including his own service, one hundred and fifty-four cases. Many of these are given in detail, and coming, as they do, from recognized authorities, are of exceedingly great interest.

In fifty-six cases of trephining for epilepsy nothing abnormal was found to account for the symptoms. Nineteen cases were reported in six months or less after operation; eleven cases were reported from one to two years after operation; one was reported eight years after operation.

Twenty-five of these cases were reported as cured, eighteen as improved; in three cases it was mentioned that a relapse occurred later.

In thirty cases of ligation of blood-vessels for epilepsy, fourteen were reported as cured, fifteen as improved; one died seven days after operation. In the fatal case the right common carotid artery was tied. No fit occurred after the operation.

In ten cases of castration for epilepsy, all were reported as cured. One case was reported four months after operation; four cases were reported more than two years after operation; in five the time when reported is not mentioned.

In nine cases of tracheotomy for epilepsy, two were reported as cured, six as improved, one as much improved, though death in this case followed in two months after the operation.

In twenty-four cases of removal of the superior cervical ganglia of the sympathetic nerves six remained well at the end of three years, ten were improved, five remained unimproved, two died soon after the operation, but not from its direct effect.

In six cases of incision of the scalp for epilepsy nothing was found to account for the symptoms. Three of these cases were reported as cured at the end of one year; two were reported as cured at the end of two years; two other cases almost similar were reported as cured.

Twelve cases of epilepsy are reported as cured by such operations as stretching of the sciatic nerve, excision of the musculo-cutaneous nerve, cauterization of the larynx, circumcision, application of a seton to the back of the neck, tenotomy of the external recti muscles, burning of the scalp, puncture of the heart, etc.

Thirteen cases of spontaneous or accidental cures of epilepsy are also reported, at a time varying from two months to five years after the traumatism, which was a fall, a burn, a wound, an amputation for intercurrent injury or disease, etc.

Passing from the cerebral to the spinal region, Dr. White cites an illustrative case of his own. A man, aged 55, was attacked on December 25, 1887, with severe pains in his arms and shoulders. A few days later there was weakness of the thighs, spreading rapidly down the legs to the feet, and upward on the body to the nipple line. In eight days there was absolute paralysis of the parts involved, including both sphincters, while at the same time the paralyzed parts became the seat of profound anæsthesia. Girdle pains developed, bed-sores made their appearance, percussion of the spine over the third and fourth vertebræ became painful. The reflexes were exaggerated, and light blows on the head in the direction of the spinal axis gave rise to frightful exacerbations of the girdle pains. In spite of every remedial measure, these symptoms increased in severity for ten months. An exploratory operation was then undertaken. Dr. White removed the spines and laminæ of the first five dorsal vertebræ, opened the slightly thickened dura, separated some firm adhesions to the subjacent pia mater, explored the cord, and, having failed to discover any serious pathological changes, closed the wounds in the dura and soft parts.

The girdle pains had entirely disappeared by the following day, sensation began to return in the feet the day after, voluntary motion in the toes after the eighth day, and so one symptom after another disappeared until the patient completely recovered, and is now earning his living by manual labor.

In the list of abdominal and pelvic disorders apparently cured by operation *per se* a number of extraordinary cases are cited. The experience of Tait, who has more than once drawn attention to the astonishing disappearance of tumors, often of large size, after a mere exploratory incision, and the corroborative testimony of Von Mosetig are cited at length. Kœnig's analysis of one hundred and thirty-one cases of tubercular peritonitis treated by abdominal incision is carefully discussed.

In response to letters of inquiry upon the subject, Dr. White received many communications from prominent operators, the great majority of them containing notes of cases not previously published.

Among the singers of these letters are to be found the names of Goodell, Hirst, Battey, Roswell Park, Lusk, Cheever, Chas. T. Parkes, Cabot, Hunter McGuire, Nancrede, Weir, Stimson, and many others of equal note.

Under the heading of miscellaneous operations the author has given several of very diverse character.

First are quoted cases of osteomalacia cured, after weeks or months of confinement to bed, by either oöphorectomy or Cæsarean section.

Passing to another subject, the question of graduated tenotomy of the eye muscles for the relief of severe nervous systems is carefully discussed. The author freely acknowledges the value of tenotomies, both complete and graduated, in the restoration of equilibrium in badly-balanced ocular muscles, but he is none the less convinced that, in numbers of instances of reported cures of chronic chorea, petit mal, and even delusional insanity, the effect of the operation *per se* is in a large measure the potent cause of the supposed cure. This belief is founded not

alone on theory, but upon the fact that in certain cases of reflex nervous troubles a cessation of the symptoms has followed the tenotomy, although this has not produced perfect equilibrium. Again, the relapses, which may take place after a perfectly successful series of tenotomies, would indicate that the nervous phenomena attributed to the insufficiency, for the relief of which the operations were made, were not correctly so attributed, and that the temporary relief must be ascribed to some cause other than the restoration of an imperfect balance of the external ocular muscles.

In seeking for a reasonable explanation of the phenomena observed in the above cases, the author has formulated the conditions which are common to nearly all of them. These are:

1. Anæsthesia.
2. Psychical influence, or so-called mental impression.
3. Relief of tension.
4. Reflex action of the "reaction of traumatism."

These influences were operative in the majority of cases, although not one of them except the last applies to the whole list.

With the idea that it was conceivable that a disease of the nerve-centres, not reached by ordinary drugs, might be affected by agents of such volatility and diffusibility as ether and chloroform, the author instituted a series of observations upon a number of epileptics in various stages of the disease. All other treatment was withdrawn; ether was given to the production of full anæsthesia at intervals of from forty-eight to seventy-two hours. The results were either entirely negative, or, in consequence of the withdrawal of their bromides, the patients grew worse.

Since, in the great majority of cases upon which Dr. White bases his paper, there were either undoubted symptoms, such as are habitually associated with organic disease, or there was demonstrable and unmistakable evidence of such disease, it is necessary to believe, in considering the psychical influence of operation, that powerful impressions acting upon the emotional or intellectual nature may affect the organic processes of secretion, nutrition, etc., and may arrest pathological changes and bring about reparative or recuperative action. Cases are cited in which such influences are clearly set forth.

The author holds that the normal equilibrium which we witness between the cerebro-spinal and the sympathetic systems as respects their influence upon the blood-vessel is obviously more or less interfered with when the brain transmits a more than wonted impulse, allowing the unrestrained action or paralyzing the influence of the sympathetic vaso-motor nerve. In this relation the author narrates some remarkable cases of hypnotism, and quotes some striking examples of the effect of the central nervous system upon the body. Belief is expressed that in many of the cases described there can be little doubt that relief of tension is an important factor in amelioration or cure. If it is assumed that preternatural tension exists in the cranial cavity, this would be relieved to an extent by trephining, and there would be but few exceptions to the rule that in each case something was done which lessened tension in the cavity or organ of the body. There are other cases, however, in which no such relief was obtained, and yet cure resulted from operation. A diminution of the tension would manifestly alter the blood-supply to any important organ in the body, and with it the nutritive processes, local and general. Beyond this nothing definite can be said, except as it applies to cases of ascites, in which, as in cases of hydrarthrosis, one tapping may prove permanently curative, because the original source of irritation and hypersecretion has already appeared.

Under the head of "Reflex Action" the author includes the "reaction of traumatism," as well as the effects of revulsion and counter-irritation.

Verbeuil has long since shown that very slight traumatism sometimes excites in the entire economy a general perturbation, and sometimes, by selection of the weak point, a sudden aggravation of lesions that are only slight or have slumbered. This same excitement, usually prejudicial, may occasionally be curative. In the case of spinal surgery above detailed, Dr. White believes that the local shock of the operation was promptly followed by a corresponding reaction, in which the vitality of the tissues was raised sufficiently high to determine a return to the normal state. In this relation the reciprocal influence of one portion of the body on another is briefly discussed.

In considering abdominal tumors attention is called to the possibility of the spontaneous disappearance of such tumors, the relation of this disappearance to the operation being coincidental; cases are cited in point. As to the cure or amelioration of growths thought

to be malignant by merely exploratory operation, a long search through the literature of the subject has met with but little success.

The cure of tuberculosis of the peritoneum as the result of exploratory incision is explained on the ground that the removal of ascitic fluid allows the peritoneal surfaces to fall together and to acquire adhesions. The tubercles are then shut in between the coils of intestine, the omentum and the abdominal wall. They are thus surrounded by tissues in a high degree of activity, which cannot throw around them the limiting zone of young cells and eventually fibrous tissue, which, if the tuberculous process is not too far advanced, may effectually resist it, and may cause it to retrograde, the process being analogous to that which we see imperfectly going on around a cancerous growth.

As a result of a study of the subject, the author believes the following conclusions are warranted:

1. There are large numbers of cases of different grades of severity and varying character which seem to be benefited by operation alone, some of them by almost any operation.

2. These cases include chiefly epilepsy, certain abdominal tumors, and peritoneal effusions and tubercle, though the improvement in the latter is, perhaps, to be explained on general principles.

3. Of the possible factors, which, by reason of their constancy, must be considered, anæsthesia seems least likely to have been effective. The other three—viz., psychical influence, relief of tension, and reflex action—may enter in varying degrees into the therapeutics of these cases, and, taken together, serve to render the occurrence of occasional cures less mysterious.

4. The theory of accident or coincidence scarcely explains the facts satisfactorily.

TREATMENT OF DIVIDED TENDON.

M. PONCET, of Lyons, has lately described (*Rev. d'Orthop.*, July, 1891) an ingenious plan for overcoming the difficulty which is often experienced, especially in old cases, in bringing together the separated portions of a divided tendon. There can be no doubt as to the necessity of attempting to unite these portions by sutures, but the operation, though usually easy and effectual in recent cases of simple division, is difficult in cases both of recent division with much loss of substance, and of old lesion followed by considerable separation of the two ends as the result of muscular action and of the retraction of the divided portions of tendon. In many of these cases it will be found impossible to bring together the separated ends, and to maintain them in this relation by sutures. It occurred to the author that the necessary approximation might be effected by detaching and, subsequently, by fixing again at a higher level the process of bone into which the injured tendon is inserted. A case is reported in which complete division of the tendo Achillis, followed by wide separation, had caused a marked degree of equinism and disabling lameness. Very good results were obtained in this instance from a prolonged course of operative treatment, which consisted at first in separating by the saw the posterior extremity of the os calcis, which was left attached to the tendon; secondly, by replacing this fragment of bone at a higher level, and by fixing it to the os calcis with an ivory peg; and, lastly, by joining together by sutures the divided ends of the injured tendon, which could now be brought into close apposition without undue traction. A like operation, it is stated, would be found useful in old cases of rupture of the ligamentum patella, in which there is often wide separation of the divided portions. In dealing with such a condition, M. Poncet would separate the tubercle of the tibia from the head of the bone, and then, as in the former case, would fix this detached process of bone still remaining united with the ligamentum patellæ to the front of the tibia at a higher level. If, however, as occurs in about half the number of cases, the tendon be torn away at its attachment to the tubercle, then its lower extremity, it is held, should be displaced in an upward direction, and fixed either by a small ivory peg or by suture to a higher portion of the head of the tibia. Separation of the tubercle of the tibia and subsequent replacement of this process, together with the insertion of the ligamentum patellæ, is advocated in the treatment of cases of old transverse fracture of the patella in which the fragments are so widely separated that they cannot be brought together except with great difficulty. A case of this kind is reported in which the tubercle, together with the ligament, was cut away from the tibia, and then replaced and fixed by an ivory peg at a higher point of the head of the bone, the distance of which from the normal position of the process corresponded to the amount of separation between the two

fragments of the broken patella. The opposed surfaces of these fragments, having been scraped, could then be readily brought together, and were fixed by a wire suture passed not through the fragments of bone, but through the tendinous structures above and below the patella. This method of "mobilizing" a tendon by osteotomy and displacement of the process into which it is inserted is likely to prove serviceable in cases in which free flexion of the forearm is hindered by retraction, due either to injury or to disease of the triceps tendon. M. Poncet states, in conclusion, that such operations as are here advocated should not be performed unless the means at the disposal of the surgeon and the local conditions of the affected limb are such as to insure a perfectly aseptic treatment.—*British Medical Journal*, September 5, 1891.

TREATMENT OF CROUPOUS PNEUMONIA.

A review made a few years ago of the cases of pneumonia treated at the Massachusetts General Hospital showed that there was little or no difference in the mortality under various methods of treatment; that whether heroic onslaughts were made on the disease by the so-called antiphlogistic plan, bloodletting, and active purgation, or whether a purely expectant plan of treatment was pursued, or supporting efforts by stimulation were employed, the percentage of mortality was not materially different. Nevertheless, but few practitioners are ready to admit that their efforts in this disease are without avail, although many will be ready to admit that the results of treatment are sufficiently unsatisfactory to warrant careful attention being given to any plan which offers a rational procedure, no matter how widely it may differ from the methods now generally in vogue.

All authorities are agreed that the danger-point in pneumonia is the heart, but all are certainly not agreed as to the mechanism of this danger.

We are all too prone to regard the *left heart* as *the heart*, and to forget that there are two hearts, more or less independent of each other. Dr. S. Henry Dessau, in the September number of the *Archives of Pediatrics*, reviews the subject quite fully, referring to the work of Dr. A. H. Smith, of New York, in a paper read before the Berlin Medical Congress in 1890. Dr. Smith called attention to the interference with the circulation produced by the engorgement of the lung, and showed that the *right heart*, and not the heart as a whole, was the main source of exhaustion, and that the character of the second pulmonary sound was a better guide to the conditions present than the pulse. The pulmonary circulation is obstructed by the permanent dilatation of the vessels in the engorged lung, and overcrowding of the right heart necessarily occurs. In the systemic circulation, on the other hand, the arterioles are contracted, forcing the left heart to more rapid and more powerful contractions, which result in overfilling the veins, and forcing upon the already overburdened right heart a surplus of blood to be handled. The overcrowding of the right heart from the venous side tends to produce dilatation of the right ventricle before a compensatory hypertrophy can be established. It is not surprising, therefore, that in individuals in whom the nutrition of the heart-muscle has been seriously impaired, as in alcoholic or nephritic cases, the mortality from pneumonia should be unusually high.

With this view of the pathology, the treatment, so far as the circulation is concerned, consists in relieving the right heart by increasing the capacity of the systemic arterial system, and by diminishing the pulse-rate.

As a means of dilating the cutaneous blood-vessels and producing diaphoresis, Dessau suggests spirits of nitrous ether, Dover's powder, or spirits of mindererus. The warm bath at 95° F., or sponging of the entire body with water at 116° F. is also recommended. The warm bath and hot sponging are given for the purpose of dilating the cutaneous vessels and inducing diaphoresis, and should be so conducted as to accomplish these ends. Conjointly with these means, the use of friction to the skin may be advantageously employed.

As a further means of relieving the right heart, efforts should be made to divert the venous blood into the liver, a reservoir capable of holding a great quantity of this fluid. It is also suggested that the increase in blood to the liver will stimulate its functions, among which is to be noted the destruction of poisonous principles in the blood. For the purpose of stimulating the liver, he suggests the use of small doses of calomel.

Aconite is mentioned as a remedy which, carefully administered, will reduce the heart's action without depression, and furthermore assist in dilating the cutaneous vessels and promoting perspiration.

With regard to digitalis, it is urged that it can only do harm, by contracting the arterioles of the systemic circulation and increasing the force of the heart's action.

The use of aconite and veratrum in pneumonia has long found favor in the hands of many practitioners, who were unable to reconcile their good results with the objections of the theoretical men, who insisted that aconite produced slow collapse.

The favorable action of calomel in pneumonia has been often noted by many practitioners, particularly those of the older school, but it seems reasonable to suppose that, with such indications for its use as are given by Dr. Dessau, better results may be expected than could be obtained by a merely empirical exhibition of the remedy.

While seeking measures to relieve the heart of the strains thrown upon it, it should not be forgotten that there are other features to be considered in pneumonia. The disease is accompanied with various nervous manifestations, evidences of the poison at work, which cannot be accounted for simply by the elevation of temperature. These poisons must be directly counteracted or eliminated. Fortunately, the means employed to relieve the right heart also assist in elimination, and in this way are probably doubly useful. But the necessity of using the most appropriate channel of elimination in the particular case must not be overlooked. In some instances, particularly in those in which typhoid symptoms, coma, and low muttering delirium intervene, with low temperature, the modern antipyretics, judiciously used, appear to exercise a truly antidotal specific effect.

How far Dr. Dessau's views may be found to stand the critical examination of the future, they are certainly at present worthy of careful consideration.

COMMON ERRORS IN THE TREATMENT OF DISEASES OF CHILDREN.

In a lecture delivered before the post-graduate course in the London Hospital for Sick Children, Dr. W. B. Cheadle (*Practitioner*, July, 1891) calls attention to some of the more common errors in the medical treatment of children, some of which are survivals of old methods based upon the imperfect pathology and physiology of a former day,—of traditional rule-of-thumb practice. A routine practice once established holds its own with remarkable tenacity long after the data upon which it was originally founded have been abandoned as untenable.

Other errors, again, have arisen from hasty and erroneous deductions based upon insufficient knowledge, especially with regard to the physiological action of remedies; for there is a disposition to accept too readily the reputed action of new drugs, and it is quite appalling to observe how recklessly new and powerful drugs are administered before their complete physiological action has been finally determined. Nevertheless, the mistakes which are most pregnant of mischief are those which occur with the feeding of infants; yet these mistakes are very common, and Dr. Cheadle classified a number of errors under this head, the more important of which are the following:

1. *The Sudden Weaning of Infants on to Fresh Cow's Milk and Water.*—This is a frequent source of disaster. The massive curds which distinguish cow's milk when brought into contact with the acid of the stomach are frequently beyond the feeble digestive powers of an infant; dilution only diminishes the quantity of the casein, it does not alter its character, and the undissolved clots under the favoring conditions of heat and moisture ferment, and set up colic, vomiting, diarrhœa. Unboiled milk readily becomes sour, and affords a favorable soil for putrefactive bacteria and disease-germs. Both clinical experience and actual experiments show that boiling milk sterilizes it as far as the putrefactive bacteria and disease-germs are concerned. And yet, as has been well remarked by Dr. Jeffries, while older people are fed almost entirely upon sterilized—*i.e.*, cooked—food, infants are fed on an unsterilized food peculiarly adapted to serve as a cultivative medium for bacteria. Boiled milk, moreover, clots less firmly and massively than raw milk, hence is more digestible. Children should be weaned on to boiled milk, with barley-water, which appears to separate the curd atoms, and hinder massive coagulation.

In the case of very young or very delicate children, however, the milk should always be peptonized at first, the degree of peptonization being gradually reduced. Whatever form of milk is used, the solution should be sufficiently dilute to begin with, the strength being gradually increased.

2. *The Feeding of Children on a Diet which is Excessive or Deficient, either in Gross Quantity or in Certain Essential Ingredients.*—The following are the chief errors in this respect:

a. Insufficient Gross Amount of Nutritive

Material.—For instance, a child is found unable to digest any mixture of cow's milk stronger than 1 in 4, and it is kept upon this. But the capacity of the stomach is limited, and it is impossible for it to take a sufficient quantity of this mixture to supply the material required for growth and full nutrition. The difficulty may be easily overcome by the addition of some of Valentine's meat-juice and cream, pending a very slow and gradual increase in milk as the child's digestive power develops.

b. Food Deficient in Fat.—This element is of especial importance in the food of children. And yet they are constantly brought up on a diet sadly wanting in it, as, for instance, most of the artificial foods, whether purely farinaceous or containing desiccated animal matter. Some condensed milks are deficient in cream, while skimmed milk is practically destitute of fat.

c. Food Deficient in Proteids.—The same thing may be said with regard to deficiency of proteids. Children, especially those with whom cow's milk does not agree, are frequently placed solely upon some artificial food, which does not supply the necessary quantity of nitrogenous matter without the addition of milk.

The removal of a portion of casein by rennet in "artificial human" milk is sometimes carried to excess, and continued too long. Children starved of these two elements are often large and fat, but flabby, anæmic, and rachitic. Indeed, this defect in food is one of the chief causes of rickets.

d. Absence of Antiscorbutic Element in the Diet.—Another not uncommon error is to overlook the necessity that the food given should possess the antiscorbutic property.

Fresh milk contains the element in sufficient quantity; but all farinaceous foods, and all the dry artificial foods, even those containing desiccated milk or egg, are wanting in it. It is apparently greatly weakened, if not destroyed, by the process of sterilizing milk or condensing it. Many of these artificial foods are good as far as they go, but all require the addition of some fresh element, such as milk, to supply the antiscorbutic property. This point is constantly overlooked; cow's milk is found to cause dyspepsia and diarrhœa, and is replaced by a manufactured food.

e. Prolonged Use of Artificially-digested Foods.—Another error, now growing common, has arisen from the discovery of the value of predigested foods,—the practice of maintaining children on peptonized or pancreatized foods for too long a time.

These preparations do excellent service in the case of children just weaned, or with small power of digesting cow's milk. If, however, these predigested foods are continued for months, nutrition falls off; the child becomes flabby, soft in bone, and in the end strikingly anæmic. Moreover, the power of digesting curd is seriously impaired, so that there is often great difficulty in changing afterwards to ordinary milk-foods.

The Treatment of Infantile Diarrhœa and Constipation.—The diarrhœa of young children is most commonly due to the irritation of the mucous lining of the intestine by undigested and decomposing articles of food, aided, perhaps, by the influence of ptomaïne poisons in causing paresis of the splanchnic nerves, undue stimulation of the vagus, or derangement of secretion of digestive juices. It is also caused apparently by irritation reflected from the dental nerves in teething, setting up increased peristalsis in the same way.

Now, in the first case, it cannot be wise to acquiesce in the condition by which nutriment is passed out, some of it partially digested, and what is digested hurried on too rapidly to permit of absorption. There can be nothing curative or beneficial in the process.

In the second case, when the flux is due to reflected irritation in teething, there can be no advantage in the nutrient drain which the increased peristalsis involves. Many, although not all, of these attacks of diarrhœa during the period of teething, and attributed to reflex dental irritation, are in reality due to direct irritation of the alimentary canal, the dentition being merely a coincidence, or only subsidiary by rendering the mucous membrane more excitable. So far from diarrhœa being a safeguard against convulsions, it is precisely those children who have been drained by diarrhœa and vomiting who are most liable to them.

Little children bear continued purging badly. Metabolism is active, and the loss of nutrient material tells heavily upon them. The mere drain of fluid is in itself alone a grave matter. Look how, in choleraic diarrhœa, they dwindle and wither rapidly, and, with pinched faces and sunken eyes, shrink to half their former size almost. Although the diarrhœa may not be severe,—three or four loose stools a day only perhaps,—the risk of permitting such flux to run on uncontrolled in a young child is a serious one. A diarrhœa which begins moderately, and which excites no apprehension, but is viewed perhaps with satisfaction, is apt to develop dangerous proportions within a very short period, and to reach a point beyond con-

trol of medicine. It is easy to keep it within limits if it is held in check from the first. But when it rages with full violence drugs may have little or no effect.

In every case of diarrhœa in a young child, however slight, it is wise to get it under control at once. It is not necessary to induce absolute constipation, but to bring the action of the bowels to natural limits. The younger the child, the more important this becomes, the risk being in inverse proportion to age. An infant is very easily killed by vomiting and diarrhœa during the first few months of life.

In the first place, as to food. Usually, if the child is on cow's milk, it is stopped absolutely. So far, so good. If milk is given at all, it should be peptonized and diluted with a little barley-water. Give nothing which is not sterilized, nothing but what is predigested or easily digested. Do not, however, commit the mistake often made of giving nothing but barley-water or veal-broth. These supply fluid, but little else; they do not yield sufficient nutriment. In the tendency to collapse, a meat essence is of great service, and ten drops of Valentine's juice should be given in a dessertspoonful of water every four hours.

With regard to the use of drugs. As a rule, astringents are given and opium carefully avoided, as being dangerous in the case of little children. Astringents, such as hæmatoxylum or catechu, are useless in the acute stage, and opium in some form is essential in anything like a severe case. Gray powder with Dover's powder in small and frequently-repeated doses should be given if there is much vomiting. Bismuth, the insoluble nitrate, in doses of 5 to 10 grains with chalk, and ⅛ or ¼ or ½ minim liquor opii sedativus, according to age, are the most efficient remedies.

In the treatment of chronic constipation three devices only appear to be adopted as a rule:

1. The administration of more or less active purgatives from time to time, sometimes once or twice a week, the remedy being repeated as often as the bowels become confined again.

2. The use of enemata, sometimes regularly every few days, for lengthened periods.

3. The inclusion in the diet of coarse foods and fruits, oatmeal, cabbage, prunes, figs, and the like.

Adults are generally treated more sensibly than children; they are given, perhaps, a daily dinner pill, or sent to drink laxative waters at some spa. But with children treatment is almost invariably limited to the three stock measures above named.

Now, if the constipation is only occasional,—an exceptional difficulty,—a free purge or enema may end the trouble and cure the complaint. And if the constipation is slight only, the use of stimulating foods containing insoluble *débris* may be sufficient to keep the bowels acting. But if they are not successful, remember they do positive harm by favoring hard accumulations and excretions.

If, however, the constipation is recurrent or habitual, and obstinate,—*chronic*, in a word,—none of these measures will be adequate to effect a cure. The relief given by a brisk purgative, if frequently repeated, tends to defeat its own end, and to retard, not hasten, the ultimate cure.

The purgatives lose their effect after a time; the frequent stimulation of the bowel renders it less and less sensitive. Stronger and stronger purgatives are required, the constipation grows more and more difficult to overcome; at last the bowels, rendered callous to stimuli, refuse to act, except in response to powerful irritant purgatives or enemata. The colon, its muscular wall in a condition of atony from overstimulation, habitually distended by fæcal accumulation and evolved gases, and not unfrequently by repeated copious enemata, becomes largely dilated, and utterly inert. The last state of the patient is apt to become worse than the first. The attempts to cure have in reality aggravated the condition.

Now, this state of chronic constipation in children requires treatment, and treatment by drugs. It is productive of many evils. In many cases, cachexia and febrile disturbance from fæcal poisoning. Sometimes night-terrors, recurrent febrile or bilious attacks, or sick headaches, anæmia, loss of appetite, feeble growth, sometimes emaciation and hysteria. Sometimes nothing but the inconvenience and discomfort and pain of passing hard and massive stools. These things require to be remedied, but not by the means so generally adopted.

Treatment, to be effective in such cases, must be *continuous*, not intermittent. The constant daily use of some mild laxative is essential to ultimate success.

Night-Terrors.—Children from two or three years old up to five or six, or even older, are liable to what are called "night-terrors." They wake out of sleep, or rather do not fully wake, but start up in a condition of great distress, calling out, screaming, or crying. They seem dazed, half-conscious, cannot be roused so as to take rational notice of the mother or nurse, and cannot be pacified. The st

of screaming, crying terror may last for hours. This form of disturbance varies in degree from mere restlessness and crying in sleep to almost maniacal delirium.

Such cases occur usually, but not invariably, in delicate, sensitive, neurotic children, and they are, in most instances, cachectic or ill-nourished. The parents are filled with apprehension that some serious brain-disease is at the bottom of the trouble. The doctor, recognizing the neurotic element, and going no deeper, usually prescribes bromides, often with good effect for the time. Now, these attacks are simply childish nightmare. There is usually, but not invariably, a neurotic disposition underlying the disturbance. The actual disturbance itself is directly due to some superadded source of irritation, central or reflex, most commonly the latter. The administration of sedatives, such as bromide and chloral, only subdues the manifestations, does not cure the complaint.

The direct sources of irritation are undue stimulation of the brain,—as of the imagination, by exciting stories; the rough treatment and terrorizing of an unscrupulous nurse; a visit to the zoological gardens, and dreams of bears and lions; or overpressure of work in school.

More frequently, however, the irritation is reflex,—sometimes, but not often, a round worm in the intestine; sometimes indigestible food at night. But by far the most common cause is constipation, often slight but persistent, the stools being hard, dry, and often light-colored.

The point especially to be enforced is the futility of the mere sedative treatment almost invariably relied upon; as a rule, nothing else is done; "it is all nervousness," doctor and parents agree.

Now, the great object should be to discover the cause of irritation and to remove it. If the cause lie in overstimulation of the brain by exciting stories, or overwork, or terrifying threats, or other fears, these must be stopped. In such cases the bromides are, indeed, most useful aids. They do not suffice alone.

If the cause, as by far most often happens, is constipation, the daily administration of laxatives with strychnine will cure the affection, bromides being administered for a short period at first until the exciting cause is removed.

Antipyretics in Acute Disease.—Among the drugs most heedlessly used at the present day are those which have the property of reducing bodily temperature, such as aconite, antipyrin, and antifebrin.

These remedies are extremely powerful, and in some cases dangerous and even poisonous. In certain extreme or special cases it may be necessary to resort to extreme and special means for bringing down the body heat. These temperature-lowering drugs are, however, too readily resorted to. Pyrexia is a symptom of disease, not the cause or essence of disease. The temptation to use such drugs is great: there is the morbid condition of raised bodily temperature attested by the thermometer, and the means ready to hand which will reduce it,—a result also absolutely demonstrable by the thermometer. It is a case in which an appreciable effect can be obtained by the administration of a remedy, and an effect which is apparently beneficial. But there is another side to the question. You cannot turn these agents on to influence the heat-centres only. Most of the drugs which have a marked influence upon the temperature are cardiac depressants. Aconite has such a powerful effect upon the circulation that even a few doses of a single drop of the tincture will perceptibly lower the pulse; sometimes a small dose renders it feeble and irregular. Indeed, grave consequences follow its too free use. Most serious collapse has resulted from a dose of 3 grains of antifebrin. Antipyrin, in the full doses required to produce marked antipyretic effect, not unfrequently causes vomiting, and occasionally collapse.

Drug Treatment of Debility, Anæmia, and Rickets.—One of the most universal mistakes, although perhaps not one of the most serious, is that of relying largely or chiefly upon drugs in the treatment of these diseases of defective nutrition. Children are apt to be dosed with cod-liver oil and preparations of iron and phosphates indiscriminately, without regard to the condition of their digestive functions and their fitness for the reception of these materials at the moment.

Thus, a delicate child, with feeble appetite, is drenched with cod-liver oil and syrup of phosphates because it is flabby, ill-nourished, and anæmic. The tongue is coated, the bowels confined. The child is, perhaps, overfed already by rich foods. The chief cause of the anæmia and defective nutrition and want of appetite is the disordered state of the functions of digestion, absorption, and fæcal excretion. A few doses of calomel, or gray powder, followed by a tonic, with some saline laxative and judicious feeding, will do far more to remedy the anæmia and debility than cod-liver oil and syrups of iron. These are excellent remedies in their proper place; but, in these

conditions of disordered function, they do more harm than good. They intensify the digestive difficulty, and take away appetite. When the disorder is rectified they may find their place again.

This habit of giving syrup of phosphates, or cod-liver oil, or both indiscriminately, whenever a child looks pale, or seems languid or deficient in flesh, has spread from medical men to the mothers and nurses: so that these drugs have become almost regular articles of diet in many families, to the detriment rather than advantage of health.

In the case of rickets, again, far too much reliance is placed upon treatment by drugs. Rickets is a diet-disease, at any rate in the main. Milk or cream, raw-meat juice, sunlight, and fresh air are better medicines than any to be found in the Pharmacopœia.

Local Treatment of the Throat in Diphtheria.—The cruel and useless practice of swabbing out the throat with caustic applications in diphtheria of the fauces has died out; but this method of applying astringents, such as perchloride of iron, or antiseptics and solvents, still survives.

The diphtheria wards in the hospitals affords exceptional opportunities for observing the effects of various methods of local treatment; and, from long observation, Dr. Cheadle has no hesitation in condemning as injurious the system of brushing out. And this for several reasons. In the first place, on account of the distress it causes to the patient. In the case of a young child it involves a severe struggle; sometimes the help of two or three persons is required to overcome the fierce resistance, and to open the mouth and reach the fauces. It causes terror, excitement, heart-strain, and physical exhaustion,—conditions most inimical in a disease tending to death by asthenia,—and the distressing process has to be repeated frequently if it is to be effectual. Moreover, apart from this matter of the wear and tear involved, the rough treatment of the fauces probably does harm by causing abrasions of the surface, and thus favoring absorption of the local poison. We know how readily fresh raw surfaces of all kinds take up poisons which come in contact with them. Witness, for example, the communication of scarlet fever in surgical operations, the absorption of morphine from a blistered surface. If the diphtherial poison is rendered more available for circulation by the application of solvents, the infective absorption is liable to be still greater.

Not only are the patients saved great distress, and doctors and nurses much trouble and anxiety, by the abandonment of the brushing-out process, but the results generally have been more satisfactory. Insufflation with iodoform or sulphur, or spraying with boric acid or corrosive sublimate solutions, are far more easy of application, and more effectual in antiseptic action.

Among other errors in treatment of which the author makes mention are oppressive poulticing of the chest in pneumonia, obstructive to respiratory movement, and tending to increase the body heat; the administration of emetics in diphtheritic croup, which is utterly ineffectual except to depress and exhaust the patient; their frequent repetition in bronchitis and whooping-cough when there is no extreme mucous obstruction of the air-passages to justify it; the too free purging of rickety children suffering from laryngismus and convulsions, under the belief that irritant matter in the alimentary canal is the sole cause of evil.

PHYSIOLOGICAL ACTION OF CHLORALAMIDE.

In a paper published in *New Remedies* for June, 1891, by Drs. H. C. Wood and David Cerna, the authors show that when chloralamide is given hypodermically in doses of from 2 to 5 centigrammes to frogs weighing twenty-five to forty grammes, it produces, without any previous evidences of irritation, a profound sluggishness, which deepens in the course of fifteen to twenty minutes to a complete general muscular relaxation, so that the animal remains in any position in which it is placed. There is also progressive slowing of the respiration, and finally complete arrest of the function at a time when the heart is still actively beating. It is probable that the muscular relaxation and the intense general apathy are cerebral,—*i.e.*, are the result of stupor, since at a time when the animal lies as though dead, pinching or other peripheral irritation produces movements which are seemingly reflex.

When given to dogs in toxic doses, chloralamide causes sleep, passing into stupor, contracted pupils, primarily increased respiration, great muscular relaxation, and finally death, which appears usually to take place through failure of the respiration. Thus, 5 grammes of the drug were given by the stomach to a dog weighing five and five-tenths kilos; eleven minutes later there was great unsteadiness of gait, with marked inco-ordination of movement. Before the giving of the drug

the pulse was 90 and the respiration 28. Twenty minutes after the administration the animal laid down and seemed unable to get up, and had a pulse of 120 and a breathing of 80. Shortly after this there was free vomiting, followed almost immediately by profound sleep. Half an hour after taking the drug the corneal reflexes were distinctly lessened, the respiration 56, and the pulse 106. One hour after the administration there was a condition of profound narcosis, the pupils were contracted, and the corneal reflexes completely abolished. Death occurred in six hours after the dose was taken.

In another dog, weighing six and three-tenths kilos, 3 grammes given by the stomach caused in twenty minutes pronounced muscular weakness, with apathy and a doubling of the rate of respiration. One hour after taking the drug the dog was profoundly narcotized, with contracted pupils, abolished corneal reflexes, and slight mucous diarrhœa. During the next half-hour there was some return of consciousness and repeated rather severe diarrhœa. Shortly afterwards, however, the narcosis came on again, and continued for over one hour. After a sleep of about five hours this dog awoke and finally recovered.

Chloralamide exercises a very distinct power in lowering the bodily temperature. Thus in an experiment in which a large dose was followed by profound stupor, ending, however, in recovery, the rectal temperature in the course of a few hours fell from 39.1° C. to 36° C., and in another dog to which a fatal dose was given, the rectal temperature fell from 36.06° C. to 29.1° C. just before death.

The most marked symptom produced by chloralamide in the authors' experiments upon the dog was stupor, with hurried respiration; with changes in the respiration and blood-pressure and pulse.

Nervous System.—The early development of stupor, and the fact that the animal lies in a profound sleep, relaxed and unconscious, at a time when reflex movements are readily produced by peripheral irritation, shows that the chloralamide exerts a powerful influence upon the cerebrum. The persistence of the reflexes until very late in the narcosis indicates that the effect of the poison upon the lower nervous apparatus is subordinate to its cerebral action, but in a series of experiments upon pithed frogs it was found that very large doses distinctly decreased the activity of the reflexes; in no instance was any stage of primary increase of sensitiveness perceived. The depression was due to an action upon the spinal cord, as was demonstrated by finding that a feeble galvanic current of fixed strength caused contractions when applied to the nerves, but produced no effect when passed through the spinal cord. This was confirmed by the experiments made with tying the abdominal aorta; such tying had no influence upon the development of paralysis, so that the authors conclude that chloralamide is a *feeble spinal depressant.*

Respiration.—The action of chloralamide upon the respiration is very pronounced. 3 grammes increased the respiration about ten-fold,—that is, from 24 to 240 per minute; this increase persisting through the long period of narcosis, but followed, when a large and fatal dose of the drug was injected, by a distinct fall of rate, which was not, however, sufficient to bring the respiration to the normal rapidity. Even just before the final arrest, which occurred suddenly, the respiratory movements were still rapid. Sudden arrest of respiration has seemed to be the rule in our experiments.

The action of chloralamide upon the respiration seems to be a centric one. Thus, in a dog in which both vagi had been cut, and the slow full respirations were steady at 12 per minute, the injection into the jugular vein of 5 grammes of chloralamide was followed in one minute by a stupendous rise in the number of respirations per minute; in two minutes the rate was 264; in four minutes, 282; and in seven minutes, 294 per minute. Under the administration of more of the remedy the respiration rose to 300 a minute, or twenty-five times the rate which it had been before the chloralamide had been injected.

It would appear, therefore, that chloralamide is a powerful respiratory stimulant, but that after toxic doses this stimulant action is followed by a paralysis; both the stimulant and depressant influence being exerted directly upon the respiratory centres.

It will be noted, however, that the results which the authors have obtained are essentially different from those reached by Dr. A. Langgaard, who, in experiments upon the rabbit, found there was during the first half-hour after the taking of 1½ grammes of chloralamide a decrease of nineteen per cent., in the second half-hour thirty-seven per cent. in the air drawn in and out of the lungs. Von Mering and Zuntz have, however, shown that when the rabbit goes to sleep there is a natural falling off of more

than thirty per cent. in the activity of the respiration; so that the decrease in the breathing of Langgaard's rabbit was not more than the norm. The authors' experiments have been made upon the dog, but they are at a loss to account for the difference in results, unless by supposing that in Langgaard's experiments the chloralamide was absorbed so slowly and in such small amounts as to have little influence upon the respiratory centre. At one time it was thought possible that the samples of chloralamide might possibly contain free ammonia, but careful chemical testing disproved this idea. In all the dogs death took place through *paralysis of the respiration*, the *heart continuing to beat actively long after the arrest of breathing.*

Circulation.—The action of chloralamide upon the blood-pressure is much less marked than its influence upon the nervous system. The fact that when the chloralamide is thrown into the jugular vein there is an immediate excessive fall, followed by recovery, indicates that the drug has a direct depressing influence upon the heart itself.

There is reason for believing that very small doses of chloralamide have a stimulating influence upon the circulation.

As already stated, when the large dose of chloralamide is injected directly into the torrent of the circulation, there is an immediate fall, which is more or less thoroughly recovered from. Under any circumstances, however, very large doses of chloralamide finally reduce the arterial pressure, and after toxic doses this fall of pressure is pronounced.

The next experiments were made upon curarized animals to determine whether the changes in the circulation, which have just been spoken of, were independent of alterations in the respirations. Several experiments were made, but the authors give in detail only one in which small doses were employed. In no case was any even temporary elevation of pressure produced, and it would appear therefore that the rise of pressure which is seen to follow the injection of the small doses in the normal dog is probably secondary to changes in the respiration.

In order to determine whether the fall of the blood-pressure is due to an action upon the vaso-motor system or upon the heart, experiments were made upon dogs in which the cord and the vagi had been divided before the administration of the drug.

These experiments show that division of the cord does not prevent immediate fall of pressure, produced by injection of chloralamide, and the authors therefore conclude that the drug has a depressing influence upon the heart.

Conclusions.—Drs. Wood and Cerna's researches have been made solely upon dogs, and therefore the following conclusions apply directly to those animals.

First. Chloralamide has a slight local influence, and in large doses tends to produce mucous diarrhœa.

Secondly. It acts more powerfully upon the cerebral cortex than upon any other portion of the nervous system of voluntary life, thereby causing sleep and muscular relaxation; but it is also a feeble spinal depressant.

Thirdly. It has a powerful influence upon the respirration, in moderate dose, by a centric action stimulating the respiratory rate, and probably also increasing the actual amount of air breathed; but in toxic dose causing death by paralysis.

Fourthly. Its influence upon the circulation is a very feeble one; the changes produced by small doses being probably secondary to other effects of the drug; toxic doses, however, depress the arterial pressure by a direct action either upon the heart or upon the muscle coats in the arterioles.

THERAPEUTICALLY CONSIDERED.

The results of the authors' experiments indicate that chloralamide is very worthy of trial as a hypnotic. Its action upon the heart is so slight that it bids fair to be valuable as a hypnotic in cases of feeble heart; while its stimulating influence upon the respiration would seem to fit it for employment in cases of nervous exhaustion. The exact clinical value of an hypnotic can, however, only be determined by clinical study. Dr. H. C. Wood has used the remedy to a moderate extent in various forms of insomnia, and so far it has seemed to him to be slower and less certain in its action than is chloral. Rarely have unpleasant after-effects been noted, but he has seen in some cases distinct headache. The statement of Hagen and Hüfler that the drug is especially valuable in cardiac asthma seems to be consonant with the authors' experimental conclusions.

PHAGOCYTE THEORY.

At the recent International Congress of Hygiene and Demography, Dr. Metchnikoff, of the Pasteur Institute, of Paris, read a paper before the Section on Bacteriology,

of which the following is an abstract (*Lancet*, August 15, 1891). He said several of the speakers had raised objections against the phagocyte theory, but it would be impossible for him to traverse all the points. Behring and Nissen, in the very important work carried on by them at the Hygienic Institute of Berlin, had discovered the bactericidal power of the serum of guinea-pigs which were protected against the vibrio Metchnikovii, and had demonstrated that this vibrio develops readily in the serum of guinea-pigs, but that in an inoculated animal they are destroyed within from three to five hours. Dr. Pfeiffer had never found these vibriones in protected guinea-pigs. The serum of the protected guinea-pig kills the vibriones in a very short time, whereas the serum of a non-vaccinated guinea-pig causes them to develop in great numbers. He was quite aware that the toxines have to be considered; but it cannot be urged in this case, because it is precisely in this disease that this important fact has been demonstrated for the first time,—viz., that the animals completely protected against infection are as sensitive to toxic doses of sterilized cultures as animals not inoculated at all. This sensitiveness is shown by the death of the animal, which occurs after the same doses in the case of the inoculated guinea-pigs as well as among those not inoculated, and also in the inflammatory and febrile phenomena which accompanied them. This fact, discovered by M. Gamaleia, had been confirmed by Dr. Pfeiffer and by himself. The vibrio of septicæmia in guinea-pigs is that of an infectious disease, in which, of all the protective factors known, the phagocytes have the most important action. The bactericidal power of the serum, remarkable though it be, does not confer immunity in disease due to bacteria. The theory of the microbicidal power of fluids of the body, whose insufficiency has been stated by one of its principal founders,—Behring himself (*Deutsche Med. Woch.*, 1891, No. 19, p. 688),—can, as we see, be of no use even in the two examples which seemed the most likely to prove his contention. The theory of the attenuating property of fluids has only a few facts to support it. The serum has sometimes the property of attracting the leucocytes, as was stated by Menart and Bordet for the serum of inoculated rabbits against the "pyogenic" disease, and by M. Roux and himself in the serum of rats. The question, no doubt, is complicated, and at all events needs fuller inquiry. He had failed to corroborate their results, because, in the case of rabbits protected against carbuncle and pneumonia, as well as the guinea-pigs inoculated against the vibrio Metchnikovii, they had supplied him with a serum which manifested no attenuating property against the above-mentioned microbes. Behring, the founder of the blood-toxic theory, has himself acknowledged that this theory cannot be easily applied except in diseases like tetanus and diphtheria, which are distinguished by their exceptionally toxic characters and by the absence of diffusion of microbes. As was proved by Vaillart and Vincent in regard to tetanus, the animals which are subject to this malady are already naturally refractory to the microbe. In this immunity from the microbe it is the phagocytes which play the principal part. If we discuss this theory fairly, and accept, for sake of argument, that the desired effect expressed by M. Ehrlich is realized,—that is, that the crisis in infectious diseases is really due to the rapid formation of the antitoxine,—it is seen that even the part played by the phagocytes is very important. Among the diseases in which a crisis occurs may be cited intermittent and malarial fever as the best known. Let us suppose that the crisis is really caused by the destruction of the toxine in the organism; but if once the microbe is left alive it can multiply itself again, and cause a relapse more serious than the first attack. We know now that the spirilla of intermittent fever are destroyed by the phagocytes during the crisis and the period of apyrexia. In monkeys, where the spirilla are destroyed by the cells, the illness terminates with the first attack; but in man, where the phagocytes have generally not been able to completely destroy the spirilla, a second attack is produced in spite of the formation of antitoxine. This is the same in intermittent fever. It is evident that only when the microbe is entirely destroyed (and deprived of life) that the organism can be considered free from it. Therefore, in this act of destruction of the microbes it is the phagocytes which perform the most important *rôle*, as has been proved in the case of anthrax and in numbers of other diseases; and, further, by the vibrio of septicæmia in guinea-pigs, arguments which seemed at first to be most favorable to the theory of the bactericidal power of the fluids of the body. Since the phagocyte theory has been propounded, it has given rise to numerous objections based on theoretical considerations, as well as on research and experiment. A great many very important facts have been

discovered, and several theories of immunity have been set forth. But the more we go into the question the more it becomes evident that the army of phagocytic cells is in reality a salutary power, which is formed in the struggle of the animal organism for existence. At one time the phagocytes act alone, at another they combine with other factors which facilitate their efficiency. But in all these cases we see these cells combating the parasites. When the phagocytes are inactive, this is a sign either of a harmlessness of the microbe, or, on the contrary, of its extraordinary virulence. This theory of phagocytes, based on the evolution principles of Darwin and Wallace, can, in its turn, become useful in the study of the phenomena of organic evolution. In studying this subject we are, so to say, spectators of the struggle, and we have before our very eyes the phenomena of natural selection itself.

PREVENTIVE INOCULATION AND IMMUNITY.

At the recent meeting of the International Congress of Hygiene and Demography, DR. ROUX, of the Pasteur Institute, of Paris, read a paper before the Section on Bacteriology, of which the following is an abridged translation (*Lancet*, August 15, 1891).

Dr. ROUX, in his paper, indicated the scope of the discussion in his opening sentence, in which he stated that, inviting a pupil of M. Pasteur to open the discussion on this subject, the organization committee had reminded them that the numerous interesting works which had recently appeared on the subject had had one point in common,—namely, the attenuation of virus and preventive inoculation, the two subjects with which M. Pasteur's name would to all time be honorably associated. With the single notable exception of vaccine, the only way of conferring immunity against any disease was the inoculation of the virus of the disease. To the only method of producing immunity Pasteur had added the less dangerous one of preventive inoculation by means of an attenuated virus. The designation "attenuated" virus ought to be reserved for virus weakened without being attenuated,—*e.g.*, by artificially lowering the vitality of the organisms producing it. The two methods of attenuation were described by M. Pasteur,—*i.e.*, the prolonged exposure of a culture to air at a suitable temperature, and the passage of the organisms through the bodies of different species of animals. Other methods have also been employed,—for example, the action of heat, the use of antiseptics, of compressed oxygen, and light. In all cases, whatever the method employed, it was found to be necessary that the attenuation should be effected slowly and gradually; rapid attenuation would render a virus altogether inactive, without impressing on it any hereditary weakness. However prepared, in order to confer immunity, the virus should be brought into contact with the tissues of the animal. In the early experiments the virus employed was always living,—that is, the weakened organisms themselves were used. Another method was by inoculating the chemical products produced by the organisms. Continuing his paper, Dr. Roux dealt with the phagocyte theory of Dr. Metchnikoff. He said that Metchnikoff had discovered that amœboid cells were enabled to assimilate blood-corpuscles in their structure. The phagocyte cells originate in the mesoderm. They have also the property of being able to digest the bodies which they have ingested, and are the only cells which manifest in the human body any cellular digestion. If we follow the history of a bacterium in the interior of phagocytes, we see that they undergo a series of special alterations very different from what takes place when they die under cultivation. Whether we inoculate virus into the bodies of animals which resist inoculation, or whether we inject attenuated microbes into susceptible animals, the more refractory the animal is, the more rapidly will the microbes be consumed by the leucocytes. If, however, any non-resisting animal cannot resist the microbes, they remain free, and no such phenomena take place. It seems, therefore, that the phagocytes are intended to protect the organism, and that they contend against the parasites which infect the human frame. People will say that there are diseases in which microbes are found particularly in the cells, and which, nevertheless, cause the death of the cells. In tuberculosis and in leprosy the cells form the seat of the bacilli, and these are among the most serious diseases, in spite of the intense phagocytosis induced in them. This fact proves that the phagocytes and all the other means of defence are on certain occasions powerless to effect any good results. They have done their best to consume the microbes, but these have adapted themselves to the interior of the cells, and have conquered. But it is not sufficient that the microbes should be absorbed; it is

sential that they should be digested by the phagocytes. Even in those cases where the struggle does not tend to the advantage of the organism, these phagocytes are still the aggressors. It has been frequently observed in tuberculosis and leprosy that the bacilli have been killed in the interior of these cells. Although the theory of this subject involves a struggle between the microbes and the cells, it does not imply that the bacilli always succeed. Phagocytosis only occurs in refractory animals, and not at all, or only incompletely, in susceptible animals. He asked whether immunity was the consequence of this property of the cells inglobulating the virus, or whether it was not possible that immunity existed on account of this absorption of the virus of the cells. If in refractory organisms they encircle the microbes, it is perhaps because these latter are in favorable conditions and remain, so to say, inert in the interior of the receptive organism. Numerous facts have been alleged to show that the inglobulated microbes were not degenerated, but in a condition of full vitality; it is noted, for example, that in frogs the bacilli which have been ingested by the leucocytes exist alive in the protoplasm of the cell, and show by their movements that they have been absorbed in living condition. Lymph taken from the body of a pigeon or a rabbit which has been inoculated with virulent bacteria, shows numerous leucocytes imprisoned in the bacilli, which can be seen growing under the eye of the observer within the interior of dead phagocytes, elongating and carrying with them the protoplasm, and changing the form of the cell, and finally escaping from it. Another demonstration of the importance of the action of the phagocytes is, that even in refractory animals microbes increase when kept out of the reach of the leucocytes; thus, in the interior chamber of the eye of an inoculated rabbit, where there are no cells, the bacteria grow freely, and their development is only checked when the leucocytes, migrating in large quantities, have incorporated them. Phagocytosis is, therefore, a phenomenon, very efficacious for the defence of the organisms, and when it fails the organism succumbs to the virulence of the bacteria. But what mysterious force attracts the cells towards the microbes? Why are the leucocytes, which show the microbes in inoculated animals, incapable of seizing them in receptive animals? In 1883 Metchnikoff propounded his phagocytic theory. He admitted that the cells were attracted to the microbes in virtue of a tactile sensibility which they manifested towards all foreign bodies introduced into the tissues, and also that the property which they have of seizing the viruses in immune animals originates in a habit which results from their first struggle with the attenuated virus with which the animal had been formerly inoculated. These movements and these preferences of the leucocytes can be easily explained, because it had been found that the leucocytes had a special chemical sensibility, a chemical property, analogous to the zoosperms of the myxomycetes: they are attracted by certain bodies and repelled by others. MM. Massart and Bordet have proved that the products of the microbes exert a very marked chemical action on the phagocytes. When a virus is introduced into the body, it proliferates and forms a substance which attracts the leucocytes, but the more active the virus the more energetic are the poisons prepared by it; and it happens that the cells which have penetrated into this toxic focus are paralyzed in their action and rendered incapable of inglobulating microbes, which flourish, therefore, without hinderance. There are even viruses, such as that of the chicken cholera, the toxine of which exerts on the leucocytes a negative chemical action, and repels them from the focus of the inoculation, and thus there are never any phagocytes found in this particular affection. This, however, is not the case with the inoculated animals, which have been rendered immune either by inoculation of the attenuated virus, or by the injection of suitable doses of bacterial products. If the animal is given a strong virus, phagocytes attracted to the inoculation point, and already accustomed to the products of the microbes, will inglobulate the latter before it has had time to prepare effective doses of its toxic material. It is, therefore, at the commencement of the disease that the trouble takes place. If the leucocytes cannot interfere at the beginning of the malady, interference at a later period on their part will be useless: the microbes will have produced enough poison to paralyze their action. Every cause, therefore, that keeps away the leucocytes from the inoculation point facilitates the infection; the theory of immunity proposed by Metchnikoff does not deny that there might be other means of protecting the organism, but it affirms that the phagocytic action is of all these means the most extensive and most efficacious. It seems to account for all the facts and to be eminently suggestive; it is thus that the knowledge of microbic

poisons and chemical inoculation have thrown light on what would otherwise have been obscure. Far from being shaken by the theories which were opposed to it, this theory of Metchnikoff had gained by the opposition by which it had been met, and that was a guarantee of its genuineness.

THERAPEUTIC EFFECTS OF CANTHARIDIN.

At a recent meeting of the Medical Academy of Genoa, DEVOTO (*Riforma Med.*, July 8, 1891) read a paper on the therapeutic action of cantharidin. Such effect as it had was due to the serum which under its influence was exuded from the vessels. He had made a series of researches on the effects of serum obtained by means of blistering-fluids in various affections. The following is a summary of his results: (1) The exudation brought about by cantharidin is never equal to blood serum as regards the quantity of albuminoid material which it contains; (2) the amount of albuminoid material is in certain cases, notably in tuberculosis, extraordinarily low; and (3) chloride of sodium is present in these albuminoid substances in much smaller amount than in blood serum. At the same meeting, Professor Maragliano said he had used cantharidin in four cases, but had been compelled to discontinue it, owing to the development of renal complications. Dr. Cantù said he had employed it in two cases, but had abandoned its use on account of the "serious general and local phenomena" which it caused.

DR. S. V. PERSHIN, of Kazan, reports (*Vratch*, No. 26, 1891, p. 627) two cases of pulmonary tuberculosis (man and woman), in which the cantharidin treatment seemed to have a marked aphrodisiac effect. In both cases the sexual excitement rapidly subsided when the treatment was discontinued.—*British Medical Journal*, August 29, 1891.

ARSENIC AS A DRUG.

In a recent paper MR. HUTCHINSON sets forth views founded on a long and large experience in the use of arsenic. He is doubtful whether it should be regarded as a tonic, for, as a rule, patients are not improved in general health by it, especially if full doses be given. They feel languid and depressed, and at times lose flesh, improving when the remedy is given up. Yet in certain morbid conditions the health improves and a tonic effect is produced, especially if small doses be given, but this may be due to the removal of the morbid condition.

It may produce many cutaneous troubles:

1. The skin may become brown and muddy-looking, dry and harsh on the trunk and limbs generally, although palms and soles may perspire. The pigmentation may be almost as great as in Addison's disease, and scaly patches may occur on knuckles, elbows, and knees.

2. A common result of disturbed skin nutrition is seen in affection of the palms and soles only, which become dry; corns may form, and in rare cases these corns may pass into epithelial cancer. Sometimes the palms and soles burn, itch, and perspire.

3. Herpes zoster may follow after the drug has been used some time.

It may easily influence the nervous system, leading to peripheral neuritis, with consequent numbness and tingling, especially in the lower extremities, and local and unsymmetrical paralyses. Its influence in producing herpes zoster is an example of its effect on the peripheral nerves. Mr. Hutchinson records a case in which a patient who had taken continuously large doses of arsenic for more than a year, became emaciated, staggered in his gait, and was partially paraplegic. After violent convulsive seizures, he passed into a state of coma and died.

He has seen several others in which the habitual use of arsenic seemed to cause or increase the liability of epileptic attacks, and one or two others in which partial paraplegia was connected with its use.

He gives his experience of its use in the following skin-diseases:

1. *Pemphigus.*—After arsenic is given, as a rule, no fresh bullæ appear. There are a few exceptions to this, especially in elderly subjects, and where there is disease of the mucous membrane of the mouth.

2. *Dermatitis Herpetiformis.*—Here arsenic is considered by Mr. Hutchinson as a certain and prompt cure.

3. *Herpes.*—In rare cases herpes occurs over and over again in the same locality. Recurrence is suspended during the continuance of arsenic. Recurrent herpes on the genitals, lips, and sometimes inside the mouth are under the control of the drug if it be steadily continued. Recurrence may again occur when it is suspended. Mr. Hutchinson has had some most remarkable cases of liability to herpes in the mouth, returning every month for one or more years, in which the liability ceased immediately the drug was given.

4. *Eczema.*—Here it is of doubtful val[illegible]

In large doses it seems to make the eruption worse. In small doses it may not hinder the cure, but it is questionable whether it materially helps it.

5. *Erythema.*—Mr. Hutchinson records the case of a boy who suffered with peculiar erythematous eruption on limbs and trunk, which never yielded till arsenic was given, when it quickly went.

6. *Lichen Planus.*—The effects of arsenic are by no means uniform in this ailment. In some cases it seemed to do much good; in others it got worse.

7. *Psoriasis.*—The effect of arsenic is as definite here as in pemphigus, but not so immediate. Sometimes its effects are first manifested by the patches taking on a congested condition, and becoming very irritable. In a large majority of cases it will cause the eruption almost wholly to disappear, but it seldom or never brings about a complete cure. Its efficiency and safety are in ratio with the youth of the patient.

In the young, arsenic is usually well borne, but Mr. Hutchinson has formed an unfavorable opinion as to its influence on elderly persons, and, unless the disease imperatively demands it, he never prescribes it for them. He thinks caution is especially necessary if symptoms of nerve degeneration are present.

As indications to its discontinuance, Mr. Hutchinson looks upon dryness, numbness, or tingling of the palms or soles, numbness of any particular part of the skin, or loss of flesh, as more important than irritation of the conjunctiva. Liability to diarrhœa or irritation of the bladder are other signs of its disagreement.—*Medical Chronicle*, July, 1891.

THE TREATMENT OF COLLAPSE.

Shock, even to extreme collapse, may be the result of a great variety of causes, so that different lines of treatment are often obviously suggested. Shock may be due, among other things, to violent mental emotion; physical exhaustion; some form of poisoning; blows on the head, chest, abdomen, or genitals (not giving rise to any obvious lesion); extensive lacerations; gun-shot wounds; surgical operations; hemorrhage, from any cause; prolonged etherization; peritoneal perforation from organic diseases; and the infinite variety of complications following disease acute or chronic.

The experience of an overdose of cocaine is a species of shock which has become familiar; and the routine cardiac stimulants seem here to be of but slight advantage. As cocaine is itself a heart stimulant, the presumption is that they act on an organ in a state of reaction from overstimulation. A most valuable antidote in these cases is strong coffee; and this would seem to be a case of paradoxical *similia similibus curantur*, as caffeine closely resembles cocaine in its action on the heart.

In the large class of cases where collapse is due to excessive hemorrhage, the failing cardiac action can be stimulated in many different ways; yet the benefit from the ordinary drugs used is often transitory, from the fact that, though the heart's action may improve, the great centres of the brain are still insufficiently nourished. The organism has been deprived of what has been called its most important "fluid tissue," the composition of which, for the immediate purpose of stimulating its own circulation, has often enough been proved of no particular importance.

Patients under these circumstances naturally attempt to supply the deficiency by drinking large amounts of water; and so long as the stomach will bear this, it should not be withheld, popular tradition and the practice of many medical attendants to the contrary notwithstanding. A large draught of cool (not iced) water will often be well borne, and the patient will experience great relief; but the custom of giving ice to suck, though immediately grateful to the sufferer, is useless for supplying what the system demands; and the constant dribbling of cold water into the stomach is very apt to bring on an attack of vomiting, as well as adding to the shock already existing.

First and most important, therefore, the indication for an increased amount of fluid in the circulation in these cases is obvious and urgent.

The method of its introduction is often a difficult one. Transfusion of blood is now pretty generally looked upon as an obsolete procedure. Suitable apparatus and a willing victim are seldom at hand; and the fluid obtained is not superior in its effects to the saline aqueous solution commonly used,—a one-half per cent. solution of common salt with a little bicarbonate of sodium added. The procedure of infusion, however, in spite of its advantages over transfusion in speed of technique, cannot be considered a rapid operation, and often much valuable time may be lost and the patient sink beyond recovery before it can be completed. In these cases of hemorrhage it is the custom to give large hot enemata of a weak salt solution as soon as possible; and, if necessary, this may

be supplemented by infusion. The effect of these enemata is usually immediate and striking. The solution, in the exsanguined state of the patient, is absorbed with astonishing rapidity from the lower bowel; from the laws of endosmosis, as well as from clinical observation, much more rapidly than in a state of health. A quart may be given and repeated in half an hour without the slightest difficulty, the first injection being absorbed in that short space of time.

In a paper published in the *Boston Medical and Surgical Journal*, July 2, 1891, from which we have drawn the preceding hints as to the treatment of collapse, DR. J. G. MUMFORD adds that his observation as to the extreme rapidity of absorption from the lower bowel led him to try giving nutritive enemata largely diluted, in other cases requiring that method of feeding, using the ordinary ingredients,—peptonized beef-juice, milk, and eggs, up to four or five ounces,—and adding half a pint or more of warm water. This mixture is so quickly absorbed that it can in many cases be repeated every four to six hours for days, and the thirst, which is often so excessively troublesome in these cases, is thus very readily controlled.

In giving these injections the ordinary bulb syringe should never be employed. A large English web catheter attached to a short rubber tube with a funnel is the best apparatus. By this means the fluid can be introduced well up in the bowel, and can be given continuously, its force being readily controlled so as not to cause reflex expulsive movements.

In collapse the hot-water enemata also serve an additional purpose, in that increased heat is brought to the abdominal viscera.

The ordinary methods of checking loss of the body's heat must never be omitted. The hot-water mattress is an extremely useful apparatus, which is too seldom seen. In lieu of this, hot bottles, with light, warmed, and thoroughly dry blankets should be employed liberally, the patient being kept flat on his back. The familiar procedure of raising the bed's foot, so as to facilitate cerebral circulation, is often useful.

Of all cardiac stimulants, alcohol probably stands first in this connection; but in giving alcohol to a patient seen soon after the accident which led to hemorrhage, one should remember that he has probably been already overdosed, or that his injury may itself be the result of intoxication. A frequently-made error of treatment is the overloading of the stomach with brandy, which is then returned, much to the patient's discomfort, as well as subsequent depression. Champagne, and brandy in soda, are often well borne. It is a good plan, however, to add the brandy to the enema, or give it hypodermically in smaller amounts. In this way also ether or the A. C. E. mixture may often be used to advantage.

It must not be forgotten that the injury to the patient may call for an operation, in which case the method of stimulation must be somewhat modified. It was taught, at one time, that an operation on a patient in collapse did not call for an anæsthetic, and that, therefore, stimulation should be pushed. The careful surgeon to-day, however, rarely operates upon a patient in profound collapse; preferring to wait for a rally, in which case, of course, an anæsthetic must be employed. In these cases ether is *par excellence* the drug to use, as, when properly administered, it is itself a stimulant. A very small amount is usually sufficient, without bringing the patient to a profound anæsthesia.

Dr. Mumford writes that he has seen admirable results follow the exhibition of liberal doses of digitalis, preferably by rectum or hypodermically, as soon as the case is seen, before etherization; and this alone, or combined with opium in some form, will often steady and strengthen the pulse, quicken the mental faculties, and quiet the restlessness and pain, whether or not ether is given. In the former case opium is of great advantage in minimizing the amount of the anæsthetic required.

After operation under ether it is bad practice to use the same liquid again as a stimulant; and theoretically, too, alcohol is here contra-indicated. As a matter of clinical experience, however, alcohol given hypodermically in small and repeated doses is seen sometimes to be of great advantage after etherization.

Of the various other drugs recommended in these cases, the value has seemed to be largely theoretical. Atropine is unsatisfactory when there has been large hemorrhage, but strychnine is useful at times as a vaso-motor stimulant, especially in combination with digitalis. Nitroglycerin, though theoretically contra-indicated, as being a vaso-dilator, often strengthens a failing heart, and is a valuable adjunct. Greig Smith, among others, speaks highly of musk by enema in infusion. The great objection to it is its expense.

The collapse from post-partum hemorrhage is treated on much the same principles, after the bleeding has been checked, supplemented by frequently-repeated doses of ergot or hydrastis canadensis. Excessive hemorrhage is not

common occurrence after a properly-conducted case of labor; and it must be very seldom, indeed, that the practitioner is called upon to tampon the uterus. In case of persistent hemorrhage, the application of a little acetic acid—five per cent.—on a pledget of cotton acts promptly and effectively, often when other ordinary expedients have failed. The acid has the advantage of being aseptic, as well as a good hæmostatic and stimulant to the relaxed uterine muscle. In these cases, too, the alternating injection of hot water into the rectum and uterus sometimes works very well. The intrauterine douche both stimulates the uterine muscles and, by imparting increased heat to the abdominal viscera, aids the general circulation; the hot enema supplements this, and the fluid, being left in the gut, is quickly absorbed. The temperature of the water should not exceed 112° F.

In cases of shock not accompanied by hemorrhage it is often necessary to inquire into the special cause of the condition. Many of the cases rally spontaneously without other assistance than rest and fresh air. Others require only mild counter-irritation. Very many, however, call for cardiac stimulants, though even their administration seems at times of little value. Among the most difficult cases to handle are those due to emotional causes, and the effect is proportionately enduring, as the cause is impossible of removal. In many cases of shock without hemorrhage the careful administration of atropine with nitroglycerin acts admirably. The cardiac action is strengthened, and the peripheral vessels are at the same time dilated, with the increase of the circulation in the cerebral centres.

It is in these cases, too, that counter-irritation acts to the greatest advantage,—the hot bath, supplemented by a mustard-leaf on the epigastrium. Irritating local applications to the mucous membranes may accomplish the same end. A man fainting from discomfort of an overloaded bladder may be revived by the passage of a catheter, even when urine is not reached; but under ordinary circumstances the irritation of this mucous membrane is not desirable.

Brandy, by the hypodermic syringe, is unfortunately the too frequent resource in all these cases. It usually accomplishes its end, to be sure, but the not infrequently resulting abscess is a serious drawback, and the operation is often a very shocking thing to the patient's friends, and most disagreeable to the patient himself if he is in a condition to appreciate the procedure.

A very useful method of getting stimulants into the stomach is to pass a small, soft catheter through the nares into the pharynx. Through this fluids can be easily introduced into the œsophagus. The manœuvre is so simple that its performance can be intrusted to any tyro. This method is most useful in some cases of collapse from acute poisoning, and in certain cases of hysteria as a substitute for rectal feeding, or by the ordinary stomach-tube.

In all cases of collapse the sustaining of what may prove but temporary reaction, by proper nourishment, must never be lost sight of. Few serious cases rally promptly and permanently, and the efforts of the surgeon, however painstaking, will often prove valueless, unless supplemented by intelligent, watchful, constant nursing.

INJECTIONS OF AMMONIO-CITRATE OF IRON IN CHLOROSIS.

DR. C. BONGIOVANNINI reports (*Riforma Med.*, July 9, 1891) the case of a girl, aged 13, who was successfully treated for chlorosis by Dr. L. Alvazzi, of Turin, with injections of ammonio-citrate of iron. For three months various preparations of iron had been given in considerable doses without benefit, and she had become so weak as to be unable to leave her bed. The red corpuscles, which were pale, averaged 4,000,000 per cubic millimetre, and there was slight leucocytosis. As the internal administration of iron had failed, it was determined to try injections of the ammonio-citrate according to the following formula: ℞ Ammonio-citrate of iron, 1.20 gramme; distilled water and laurel water, of each 5 grammes. The injections, which were given with an ordinary Pravaz's syringe, were begun on December 22, 1890, one dose of 2 centigrammes of the salt being given once a day; the amount was gradually increased, till on December 30 it had reached 12 centigrammes, still given in one injection, No ill effects being observed, on January 8, 1891, two injections of that strength were given each day, and on April 9 the patient was discharged cured. Two or three of the injections were given under the skin, but this having on each occasion caused severe pain, all the others were made into the substance of muscles (glutei, muscles on outer side of thigh and arm, pectorals, etc.). The injections were given with strict antiseptic precautions, and were always followed by somewhat vigorous and prolonged massage at the seat of injection. Pain seldom lasted long,

and no abscesses or even swelling followed the injections, nor did the temperature rise. When discharged, the red corpuscles had recovered their natural color, and averaged 4,350,000 per cubic millimetre, and the proportion of white corpuscles was normal. The hæmoglobin had risen from 35 to over 95, and the girl's weight had increased from 72 to 84 pounds. Her appearance and her general health had immensely improved.—*British Medical Journal*, August 29, 1891.

THE TREATMENT OF GALL-STONE.

According to Naunyn, about every tenth adult suffers from gall-stones, and although lately surgical interference has been resorted to, there still remains much for the physician to do. At the recent Congress for Medicine at Wiesbaden the medical treatment of gall-stones attracted considerable attention, and interesting papers were read on this subject by Naunyn, Fürbringer, and Riedel. These have been analyzed in the *Medical Chronicle* for August, 1891, by DR. JAMES MACKENZIE. It is necessary first to understand the mode of origin. Gall-stones are formed if the bile is laden with the ingredients that form them, and which are very insoluble,—namely, cholesterin and bilirubin chalk. The cause of the increase of this in the bile is disputed. One view states that the excretion of cholesterin and of chalk is too great, cholesterin because of anomalous metabolism, chalk because of too much chalk being in the food. The other view is that the bile has lost its power of dissolving these bodies. Cholesterin forms two per cent. of the solid ingredients of the bile, and this proportion is fairly constant, independent of disease or food, and also of the amount present in the blood. There is an increase, however, where there is catarrh of the bile-passages. Chalk also is formed from the diseased mucous membrane, the amount otherwise being independent of the quantity taken with the food. Naunyn holds that it is untenable to look for the formation of gall-stones in decomposition of the bile. Physiological considerations have afforded no help in accounting for the formation of gall-stones. The frequency of the occurrence can only be safely based upon post-mortem examination. The percentage found after death varies from five to twelve per cent. with different competent observers. The differences in these observations are probably due to the fact that the gall-stones are easily overlooked. From all statistics three very important deductions can be made: 1. Gall-stones are four and a half times more frequent in women than in men. 2. Before 30 they are infrequent (two to three per cent., Schroeder), after that age they become much more frequent,—ten per cent. In old age their frequency becomes strikingly increased,—twenty-five per cent. over 60 years of age. 3. Women that have borne children are most frequently affected of all. Thus Schroeder found that among women with gall-stones ninety per cent. had borne children. It must, therefore, be concluded that the most distinct cause is the stagnation of the bile in its passages. In women this is favored by clothing and pregnancy, both of which retard those movements of the diaphragm that assist in the expulsion of the bile. The frequency of gall-stones in old age is due to retardation of the bile flow, through atrophy of the smooth muscles in the walls of the bile passages (Charcot). The stagnation produces disease of the mucous membranes of the passages, and the cholesterin and bilirubin chalk arise in consequence of destruction of the epithelium. At first an amorphous deposit is formed, which by absorption of the fluid becomes granular. These granules increase by disposition of bilirubin chalk and an infiltration of cholesterin. The latter, supplanting the bilirubin chalk, forms ultimately the beautiful pure white cholesterin solitaire. A further secondary formation occurs in the deposition of carbonate of lime, of importance because the stone is then no longer soluble. The cause of the stone forming desquamative angio-cholitis is the retarded discharge of the bile, through which an infection of the bile-passage is favored. It is also possible that bacillus growth in the bile favors the formation of gall-stones. Probably it is in this manner that the intrahepatic stones are formed. In regard to symptoms, there should be distinguished a regular form and an irregular form of the disease. The former occurs where there is simply lodgement of the calculus in the gall-bladder or passage of the stone along the duct. The irregular form is seen when there is infectious angio-cholitis with abscess in the liver, fistula, and all the other consequences. As a final issue of the regular gall-stone disease may be the formation of carcinoma in the biliary passages and the liver. In regard to the symptoms, it should be remembered that the stone is oftenest lodged in the cystic duct, giving rise to colic, and less often in the common bile-duct; therefore the occurrence of jaundice is not so common.

Further, it should be borne in mind the ease with which infection can arise, giving rise to biliary fever. The connection between gall-stone and food is not proven, so that it is not possible to recommend a prophylactic diet. For the removal of gall-stones, cholagogues are not to be depended on. After an abundant varied diet the bile flows more freely than after cholagogues. In practice, errors of diet should be avoided, and alkaline saline waters (particularly the hot Carlsbad) act beneficially. These act by increasing the peristaltic activity of the digestive tract, and increasing the flow of blood to the abdominal organs. In the peristalsis the bile-passages participate, and the movements of the bowels act as a form of massage, while the diseased mucous membrane benefits by the increased flow of blood. The injection into the rectum of large quantities of hot water serves the same purpose.

Fürbringer based his remarks on sixty-four cases he had carefully observed, so that there was no doubt of the diagnoses. Of these, thirteen were men and fifty-one women. The chief site of pain did not lie in most of the cases in the right hypochondrium, but in the epigastrium, radiating from thence upward and downward. With jaundice there was enlargement of the liver, and the dilated gall-bladder was not infrequently to be felt. In twenty-four out of forty-one there was slight fever; considerably slowing of the pulse can accompany the fever. In thirty out of forty-one there was jaundice. Duration of attack showed a variation from transient to several days' duration, with intervals of weeks and years. The *corpus delicti* should always be looked for, and its absence does not vitiate the diagnosis. Very seldom was the stone perceived through a peculiar grating noise in the gall-bladder. When there is fever, it is irregular and accompanied by other symptoms pointing to the liver. When protracted for weeks and months, the victim declines with severe cachexia (liver phthisis). The local pain may not be excessive till there is inflammation and ulceration of the peritoneum, on account of the latency of the catarrh of the gall-bladder and biliary passages. In suppurative inflammation of the liver, pain in the right hypochondrium and jaundice are frequently wanting. When perforation takes place into the peritoneal cavity, a fatal peritonitis is set up by the decomposed bile. When a fistula is formed it is often very distant, and daily discharges large quantities of bile and rarely gall-stones. Most frequently the perforation takes place into the small intestine. The gall-stone can here cause grave mischief (ileus, perityphlitis, etc.). Finally, there may be set up interstitial hepatitis (too frequently doubted), as well as adhesions between the liver and neighboring organs. The latter may be a source of great discomfort. In regard to the diagnosis, gall-stone disease was often mistaken for gastric ulcer, cramp of the bowel and stomach, renal colic, and hepatic neuralgia. Further, the pain may lie in any region of the abdomen save that of the liver. Slight jaundice is not easy to recognize, but is valuable when it does occur. Surgical interference should not be delayed too long in order to aid the diagnosis. The puncture of the gall-bladder is dangerous. Care should be taken not to confuse the intermittent fever with malaria or typhus. In regard to prognosis of the attack it is favorable, but of the after-condition rather grave, although the surgical methods have improved it. It is consoling to know that serious cases can obtain ultimate recovery by internal treatment. Of Fürbringer's cases, thirty-four per cent. were cured, forty-two per cent. were improved, ten per cent. were unsuccessful, and fourteen per cent. died. Of six treated by surgical means, four recovered. In regard to treatment, it is necessary to prevent the formation, to remove the concrements, and to combat the tendency to the formation of gall stones. Morphine and opium are the best agents for subduing the attacks of colic. It is folly to try to dissolve the stone. The endeavor must be made to increase the mechanical driving force of the bile and swill out the stone. Health resorts and springs have much success and not a few failures. The salicylate of sodium and the oil cure has been useful in Fürbringer's hands. With the latter the liver becomes permeated with fat, and a saponified fat is formed which can be found in the stools as pseudo-gall-stone. While this treatment can often be borne, it sometimes gives rise to distressing dyspepsia. In regard to diet, more depends on temperance than on the choice or denial of certain foods. There is no value in theoretic or empiric reasoning, and there should only be excluded excessive fatty and sugary foods, alcohol of bad quality, and notoriously indigestible matters. Of high value are warm baths, rational clothing, dwelling in fresh air, and avoidance of over-exertion. Fürbringer cannot praise the attempts to express the stone by kneading the gall-bladder and pressing the liver. Notwith-

standing the brilliant results of surgical practice, he thinks that operative procedure should not be lightly undertaken. Still, when all other means fail, and the patient is threatened with cholæmia and pyæmia, then he would advise surgical interference. The operative cicatricial bands is often valuable.

Riedel gives his experience of thirty-two cases. Sixteen of these had not jaundice, on whom he operated. All recovered, and no fistula was left behind. Sixteen had jaundice, and the result was not so satisfactory. Ten completely recovered, two were under treatment, and four died. Of these four, one died after complete extirpation of the gall-bladder, two were in an exhausted condition when they came under treatment, and one died in consequence of escape of bile into the peritoneal cavity.

THE PRODROMAL AND EARLY SYMPTOMS OF BRIGHT'S DISEASE.

In the *Boston Medical and Surgical Journal* for September 10, 1891, DR. CHARLES F. WITHINGTON enumerates the following symptoms in the order of their priority, as determined through an analysis of seventy-five cases of chronic interstitial nephritis.

1. Polyuria, with frequent micturition, and especially increased nocturnal micturition, was experienced by twenty-five persons, or thirty-three per cent. One had it twenty years before death, and four for two years and over. Eight persons, giving data on this point, showed an average of three and three-fourths years of polyuria before death. This average does not, as some others will be seen to do, require to be raised to represent the true figure.

2. Dyspnœa was experienced by forty-seven, or sixty-four per cent., being the most frequent symptom. The longest case was forty years. The average of twenty-six persons, giving dates, was one hundred and eight weeks, or a little over two years. But this average requires to be materially raised, from the fact that it does not include four persons who had had dyspnœa for "years" and one who had had it "always." So that the true average date of dyspnœa should be carried back nearer to that of polyuria.

3. Œdema, observed in thirty-eight cases, or fifty-one per cent. (This will be remembered in comparison with the eighty-four per cent. of œdema in the mixed cases of chronic Bright's.) The longest cases were fifteen and twelve years. The average of twenty-nine persons was sixty-nine weeks, which requires to be slightly raised on account of a thirtieth person who had had it for "years."

4. Cough occurred in forty-one persons, or fifty-six per cent. The longest ten years; two for five years. The average of thirty-two persons, forty-seven weeks, which is somewhat too low, as there were three others who had had it for "years."

5 (or 6). Palpitation, nineteen persons, or twenty-five per cent. The average of nine persons had had it for twenty-six and a half weeks, which is a little too low, as it does not include one person who had had it for "years."

6 (or 5). Headache, twenty persons, or twenty-seven per cent. Two had had it for "always" and one for "years," which should materially raise the average of eleven others who had had it for twenty-one weeks.

The remaining symptoms average too near each other and are based on too small a number of cases to warrant an opinion on their relative priority.

Nausea and vomiting present in thirty-seven patients, or forty-nine per cent. One had had vomiting "always," one for "years," and twenty-four others averaged nine and a half weeks before death. This average is probably too low.

Amblyopia, in eleven persons, or fifteen per cent. One person had had it seven years. Including him in six cases giving dates, we should have an average of fifty-four weeks; omitting him, five cases give sixteen weeks, which is doubtless nearer right.

Vertigo, in thirteen, or seventeen per cent. The earliest twenty-two weeks; the average of five, nine weeks.

Diarrhœa, in sixteen, or twenty-one per cent. One had it for ten years. The average of ten others, 6.2 weeks. (Per contra, three record constipation.)

Lumbar pain, in four persons, or five per cent.; which shows the popular fallacy of backache as a symptom of Bright's, at least in this form.

Cerebral hemorrhage occurred in ten persons, or thirteen per cent. The earliest was five years before death. Three had two attacks, and one had three. Six died from hemorrhage of brain or meninges.

Other hemorrhages occurred as follows: of the nose, seven; of the lungs, six; bowels, two; stomach, one.

Delirium occurred in fifteen, or twenty per cent. It was generally a late symptom, the earliest case being three months, and eleven

cases appearing first within the last two weeks of life.

Disorders of sleep are thus classed: insomnia or vigil in eleven; drowsiness or sopor in four. Rather a late symptom.

Convulsions, of course, occur late. They are recorded in only seven, or nine per cent. Coma, prior to the day of dissolution, in twenty-six. Cyanosis is spoken of in eleven cases; in at least five it was noted ten days or more before death.

Of other symptoms, infrequent but of significance, the author mentions: itching in two persons; other paræsthesiæ in three; thirst in four; neuralgia in two; sore-throat in two; Cheyne-Stokes respiration in three.

BROMOFORM IN WHOOPING-COUGH.

Dr. S. Schippers furnishes (*Nederlandsch Tijdschrift voor Geneeskunde*, August 29, 1891) further proof of the value of bromoform in cases of whooping-cough. Bromoform is the terbromide of formyl, having a chemical composition ($CHBr_3$) identical with that of chloroform, in which the chlorine is replaced by three atoms of bromine. It is a bright clear liquid, with a peculiar but not unpleasant ethereal odor; its specific gravity is 2.9, or more than twice that of chloroform; it is soluble in alcohol and ether, and but slightly so in water; its taste is sweet; it does not affect the mucous membrane of the mouth, and is not irritant in its action. It is rapidly decomposed by light, bromine fumes being slowly given off. When used internally, no deleterious effects have been observed when administered in the following doses: In children from 6 months to 1 year old, 2 minims thrice daily; from 1 to 2 years of age, 3 minims; from 2 to 3 years, 4 minims; from 3 to 4 years, 5 minims; and from 4 to 7 years, 6 to 7 minims may be given in a teaspoonful of syrup; for adults the dose is .5 to .8 gramme in capsules. Stepp, of Neurenberg (*Deutsche Medicinische Wochenschrift*, Nos. 31 and 44, 1889), who first advocated its use, treated one hundred children affected in various degrees with pertussis, and ranging in age from 6 months to 7 years, without a single instance of failure; a cure was usually effected in from two to four weeks; the paroxysms diminished in number and severity after from three to five days' treatment, falling in some cases from thirty or forty per day to ten, the cough then slowly losing its paroxysmal character. In one of his cases—an infant 24 weeks old, whose attacks averaged thirty-five daily, signs of asphyxia developing at the occurrence of each of these—the child in a short time had a daily diminution to seven, and was entirely relieved in four weeks. Complications, when bromoform was used, were less pronounced and less frequent, and when they occurred ran a better course, not only in recent, but also in long-standing cases, where the subjects had become exhausted by repeated attacks of vomiting. As to the dose employed, this must be regulated by the degree of severity attained by the affection and the age of the patient; it must be perseveringly administered, or the frequency and intensity of the symptoms may return. Löwenthal (*Berlin. Klin. Wochenschrift*, July, 1890), in consequence of such favorable results, made a trial of bromoform in the treatment of whooping-cough in the polyclinic of Professor Senator in Berlin; he employed the drug in one hundred cases, the ages of the patients ranging from 8 weeks to 7 years, and obtained the most gratifying results. The vomiting, when it occurred, was the first symptom to disappear; hemorrhage from the nose and mouth ceased in from three to five days, and the fits of coughing soon lessened in number and severity. Neumann (*Therapeutische Monatshefte*, July, 1890) has also obtained favorable results in the treatment of twenty-five cases. Dr. Schippers, in the trial of this drug in his polyclinic and in private practice, had, up to April 1 of this year, treated two hundred and fifty cases, and he summarizes the results of his observations thus: 1. Bromoform in the doses advocated is a completely harmless remedy. 2. The paroxysmal attacks diminish not only in number but also in severity, while the mucous secretion is more easily got rid of. 3. It markedly shortens the duration of the attack. 4. The post-paroxysmal vomiting disappears in from two to three days. 5. Nasal and other forms of hemorrhage cease also in a short while. 6. It acts beneficially when complications such as pneumonia supervene, as by lessening the attacks of coughing rest is afforded to the affected organs. As to the rapidity of its action in effecting a cure, he differs from Stepp in that sometimes the time is extended to eight weeks. Two cases of bromoform poisoning have been recorded (*Therapeutische Monatshefte*, December, 1890, and January, 1891), a child having in each case taken a large quantity of the pure drug from a phial which had carelessly been left within its reach. Symptoms of extreme collapse supervened, but both cases made good

recoveries under the prompt employment of restoratives. The drug should, therefore, always be kept in the dark and out of the reach of children. The manner in which it acts, whether as an antiseptic or as a specific, is still obscure.—*British Medical Journal*, September 19, 1891.

THE TREATMENT OF NON-MALIGNANT RECTAL STRICTURES.

DR. WELLER VAN HOOK terminates a paper upon the treatment of non-malignant rectal strictures, published in *The American Journal of Obstetrics* for September, 1891, with the following conclusions:

1. The treatment of rectal non-malignant strictures should not stop short of the complete removal of the symptomatic and pathological consequences of the stenosis.

2. For therapeutic purposes every case of rectal stricture should be carefully examined and referred, according to its longitudinal extent, to the category of valve-like, annular, or tubular stenoses, and, according to its pathological relations, to the class of uncomplicated or complicated strictures.

3. Most valve-like strictures are amenable to treatment by gradual dilatation.

4. Some of the annular strictures are sufficiently distensible to be relieved by gradual dilatation; but this treatment must, in this form of malady, be kept up indefinitely.

5. The uncomplicated annular contractures not amenable to gradual dilatation, and the tubular strictures, below the peritoneal limit, are permanently curable by Péan's method, by modified amputation, and occasionally (but with much uncertainty) by posterior linear proctotomy.

6. Cases of stricture complicated by ulcers or fistulæ must usually be simplified by a preliminary posterior proctotomy and scraping out of fistulæ before the radical operation is attempted.

7. Treatment by gradual dilatation, prolonged indefinitely, as is usually necessary, must be tolerated only when relief is complete and when the patient is sufficiently intelligent to comprehend its importance.

8. Forcible dilatation or divulsion is dangerous, and should be abandoned.

9. Internal proctotomy leaves a wound exposed to infection without proper dressings or drainage, and should be regarded as dangerous.

10. External proctotomy is a valuable temporizing measure, giving free outlet to fæces and pus, and allowing the patient to recuperate in general health so as to bear a radical operation.

11. Péan's operation is objectionable, because it permanently destroys the action of the external sphincter.

12. Plastic operations by the introduction of a mucous flap fail because of suppuration.

13. Colotomy should be resorted to only in those exceedingly rare cases in which there are undilatable tight strictures too high up to permit excision, and in which anastomosis cannot be performed.

14. If ever resorted to, colotomy should be done in such a way that the preternatural anus can be subsequently closed, if found desirable.

15. Modified amputation of the rectum, as described, offers almost, if not quite, the only reasonable hope of permanent cure without loss of sphincteric control in the undilatable strictures, annular and tubular.

16. The peritoneum is to be opened for the treatment of this condition with the same precautions as are adopted in the operation for the removal of malignant neoplasms.

PHYSIOLOGICAL ACTION OF KOLA NUT.

DRS. LOGINOFF, DAVYDOFF, and KOTLAR have undertaken their interesting experiments conjointly, conducting them (in Professor V. A. Manassein's clinic) on seven healthy young men (three medical assistants, or *feldshers*, and four medical students), aged from 18 to 26. In each instance the observations lasted ten days, being divided each into two equally long periods, during one of which dry powdered kola nuts (of Darmstadt) were given daily, in the dose of 4 grammes, equivalent to 1.6 grain, or .093 gramme, of caffeine. Of the seven experiments, in three the young men were left under the ordinary life conditions ("a relative rest"), while in the remaining four they were made (*a*) to play dumb-bells, weighing from ten to fifteen pounds, for from half to one hour every morning and evening; and (*b*) to undertake daily walks of two or three hours' duration. The young men's dietary consisted of butcher's meat, milk, butter, bread, tea, sugar, kitchen salt, and drinking water. The following are the principal results obtained by the authors:

1. Dr. Loginoff has found that under the influence of kola, (*a*) during rest the assimilation of proteids usually decreases from .6 to 3.1 per cent.; (*b*) during the period of exercise the assimilation commonly falls from .3 to 4 per cent.; (*c*) the nitrogenous metamorphosis is depressed both during rest and muscul

work, the diminution varying from 4.9 to 19.047 per cent. In other words, as far as systemic proteids are concerned, the nuts appear to constitute a "conservative" agent (Dujardin-Beaumetz's *aliment d'épargne*, Mantegazza's *aliment nerveux*); (*d*) during the period of rest the "conservative" effects seem to be more considerable than during that of exercise. (During the latter, the decrease in the metabolism varied from 3.157 to 10 64 per cent.; during the former, from 4.91 to 19.047.) (*e*) The use of kola distinctly intensifies the sensation of well-being, and largely prevents the feeling of fatigue or languor after exercise.

2. Dr. Davydoff's investigations have shown that, under the action of the nuts, (*a*) the assimilation of food fats usually slightly decreases both during rest and exercise. (In one case the assimilation increased .043 per cent. during the rest period), but in the remaining it was diminished, the decrease varying from .061 to .725 per cent., and averaging .308. During the period of rest the diminution averaged .137; during exercise, .394 per cent.) (*b*) The assimilation of water remains unaltered. (*c*) The aqueous metabolism (*i.e.*, a per cent. relation of urinary water to assimilated water, plus a per cent. relation of cutaneous and pulmonary aqueous losses to assimilated water) is subject to oscillations; but, on the whole, tends to decrease, which is especially marked during exercise. (During the period of rest, in two cases, the metabolism rose on an average 4.17 per cent., while in one it fell 10.32. During exercise, in three cases, it sank on an average 9.67 per cent., and only in one it increased 3.04 per cent.) (*d*) Appetite is markedly diminished. (*e*) The subjective state is considerably improved. (*f*) Given a certain definite amount of muscular work, the same subject, when taking kola, performs it more easily and feels less fatigued than when receiving no kola. (*g*) The respiration is unchanged, (*h*) but the pulse usually becomes slower and fuller, which occurs in about thirty or forty-minutes after a dose, and that both during rest and exercise, the retardation averaging 7.6 beats per minute. (*i*) Kola might prove a useful remedy in certain cardiac affections.

3. Dr. Kotlar, who studied the assimilation and metamorphosis of chlorine, phosphorus, and sulphur, concludes that, under the influence of kola, (*a*) both during rest and exercise, the assimilation of phosphorus improves, while that of sulphur decreases. The assimilation of chlorine is diminished during rest, but remains unaltered during exercise. (*b*) The metabolism of chlorine decreases, and that during exercise more considerably (on an average, 15.6 per cent.) than during rest (12 per cent.). (*c*) The metabolism of phosphorus, during rest, is also decreased (on an average 8.3 per cent.), while during exercise it is subject to oscillations. (In two cases it decreased three and seventeen per cent. respectively; in one it rose twenty per cent., and in the fourth remained unaltered.) (*d*) The metaphorphosis of sulphur usually somewhat decreases both during rest and work. (*e*) A "specific metabolism of phosphorus" (in the sense of Professor A. M. Levin,—*i.e.*, a per cent. relation of the phosphorus metabolism to the nitrogenous one) is increased both during rest and exercise. The same may be said with regard to a "specific metabolism of sulphur,"—*i.e.*, a per cent. relation of the sulphurous metabolism to the nitrogenous one. In other words, the disintegration of substances containing phosphorus and sulphur is inhibited by kola to a lesser extent than the disintegration of nitrogenous compounds. (*f*) On the whole, kola seems to be a "moderator" (Duhamel) of the systemic tear and wear induced by exercise.—*Medical Chronicle*, July, 1891.

TREATMENT OF POST-PARTUM HEMORRHAGE.

Dr. Velits, of Buda-Pesth (*Orvosi Hetilap*, No. 10–12, 1890), reports thirteen cases which he treated by means of iodoform-gauze tampons during labor (twice in the puerperium), to control hemorrhage, and draws the following conclusions:

1. Iodoform-gauze may be considered as thoroughly aseptic in employing it for obstetrical work.

2. In atonic hemorrhages the iodoform-gauze tampons act as irritants and produce permanent contraction of the uterus. To obtain this result, only a small quantity should be introduced into the uterus, so as not to interfere with retraction.

3. In hemorrhages due to the state of the blood itself, the iodoform-gauze is worthless, in fact is injurious, for it tends to keep up the hemorrhage. In these cases we can obtain excellent results by employing weak solutions of chloride of iron.

4. When the hemorrhage is due to a high cervical tear, the only safe method of treatment is the suture.

5. Hemorrhages which occur in the latter part of the puerperium, or directly after labor, and are associated with myomata, can only

be controlled by packing the uterine cavity firmly and completely with iodoform-gauze tampons.—*The American Journal of Obstetrics*, September, 1891.

ON THE THERAPEUTIC USES OF MEDICATED SUPERFATTY SOAPS.

DR. CARBLOM, of Riga, reports a series of therapeutical experiments with the different sorts of Eichhoff-Unna's medicated "superfatty" soaps, applying them in one of the following four ways: 1. A warm lather was rubbed into the skin, and after a short time washed away. 2. The lather was rubbed into the skin in a similar manner, but removed by means of wiping with a dry towel or linen. 3. The parts were covered with a thick layer of the lather and allowed to dry. 4. The lather was similarly thickly painted over the area, and then covered with some water-proof, and thus Dr. Carblom has come to the conclusion that,—

1. A superfatty resorcin-and-salicylic-acid soap proves especially useful in parasitic cutaneous affections, associated with hyperplasia of the cuticle,—such as parasitic or seborrhœic eczemas, psoriasis, acne, ichthyosis.

2. A salicylic-acid-resorcin-and-sulphur soap is indicated in similar affections, but more especially in such cases as are characterized by a more chronic course of the cutaneous inflammation, deeper hypertrophy, and desquamation.

3. A salicylic-acid-resorcin-sulphur-and-tar soap is serviceable in the same category of affections, but particularly in common psoriasis.

4. All the three aforementioned soaps can be also strongly recommended in favus and tinea tonsurans.

5. A quinine soap gives good results in pityriasis versicolor, and in the intertrigo eczemas of children. An after-application of some bland powder is advisable.

6. A three per cent. hydroxylamin soap proves beneficial in lupus, tinea tonsurans, inveterate cases of psoriasis and eczema, and, occasionally, even in lepra and lues. The application usually causes some burning pain.

7. A five per cent. iodoform soap affords a good means for cleansing and simulating indolent ulcers.

8. A creolin soap can be employed with advantage in scabies, impetigo contagiosa, intertrigo, as well as in bromidrosis. The lather should be firmly rubbed into the affected parts several times a day.

9. An ergotin soap is of service in simple rosacea, frost bites, and for treating congested cicatricial areas of any kind.

10. An iodine soap can be successfully used (*a*) as a resorbent in cases of goitre or superficial granular enlargements, and (*b*) as a parasiticide in cases of tinea tonsurans, pityriasis versicolor, psoriasis, etc. It should be kept in mind, however, that the preparation possesses a powerful irritant action, and hence its application should be from time to time interrupted, and a zinc starch powder employed instead.

11. A salicylate-and-creosote soap produces excellent results in lupus. It may be used either as a wash to the part or in the form of lather (protected with a water-proof dressing), or the soap application may be alternated with some surgical procedure.

In comparison with plasters, salves, pastes, etc., the use of soaps is said to be both more convenient and a good deal cheaper. On the whole, the introduction of the preparations can be safely termed an important advance in dermato therapeutics.—*Pharmaceutical Record*, September 10, 1891.

THE HYGIENIC IMPORTANCE OF COPPER.

At the recent International Congress of Hygiene and Demography PROFESSOR LEHMANN read a paper with the above title before the Section on Chemistry and Physics in Relation to Hygiene, of which the following is an abridged translation (*Lancet*, August 15, 1891). The author pointed out that, in spite of many investigations, great difference of opinion still exists with regard to the hygienic importance of copper. Men attacking and defending the deleterious action of copper have often gone too far in the matter. The paper dealt only with the importance of such copper salts as enter the organism through artificial greening of vegetables, through addition of sulphate of copper to bread, and through careless use of copper vessels. It was not proved by one well-observed case that copper salts—that is to say, a quantity of 150 to 200 milligrammes of copper having entered the organism of a healthy adult at one time and in a certain dilution in the course of eating and drinking—can cause a disturbance in health worthy of any remark. During copious meals about 200 milligrammes of copper can enter the body with preserves and bread without being noticed to any

tent by the senses. In no case of severe acute copper-poisoning through copper vessels recorded in the literature of the subject had it been shown that anything like the amount of copper necessary to injure the organism—that is to say, 150 to 200 milligrammes—had been taken. Ptomaïnes and toxalbumins were often the true cause of the trouble. In other cases it has been shown that no reason exists for regarding the small quantities, often merely traces of copper, which were found as the cause of death. A chronic copper-poisoning through the entrance of small quantities of copper salts (20, 30, or even 50 milligrammes of copper daily) does not exist in man or animals, although copper is absorbed in considerable quantities, stored in the liver, and excreted by means of the bile, the intestines, and the kidneys. Deduced from these considerations, a direct injury of acute or chronic character is not to be feared from such quantities of copper as find entrance into the body through moderate and technical *reverdissage*, preparation of bread with copper and somewhat careless use of copper utensils in the household; though carelessness in culinary work may be the cause of acute vomiting and purging, but hardly anything more serious. Hygiene demands the prevention of the use of copper-coloring for preserved vegetables because (*a*) the danger of abuse exists (the careless addition of large quantities); (*b*) there is neither any improved taste of the preserves nor any additional preservative power gained; (*c*) no reason exists for coloring the preserves more intensely green than they are when freshly cooked. The addition of small quantities will be punishable as an adulteration and imposition as to the quality, etc., not on hygienic grounds. The addition of copper to bread should be absolutely forbidden, because (*a*) there exists the danger of careless addition in large quantities; (*b*) it is possible to bake with spoiled and, under circumstances, injurious flour; (*c*) it becomes possible to add a larger quantity of water (six to seven per cent.). As far as the severe cases of so-called copper-poisoning through the careless use of household utensils is concerned, a severe copper-poisoning of an adult can no longer be considered, unless it can be proved that at least 200 milligrammes of copper have been consumed by the unfortunate individual. Much more care is to be desired than formerly; that is, that in legal judgment the possibility of other poisoning—namely, ptomaïnes and toxalbumins—be considered. A case of copper-poisoning should never be taken for granted simply because the presence of no injurious substances could be ascertained other than copper, which is so easy to find even in traces.

The PRESIDENT was struck with the large amount of copper which, according to Professor Lehmann, was tolerated in the system. He had never heard of the addition of sulphate of copper to bread in England.

MR. GOODFELLOW had examined three hundred specimens of bread in England, and not one contained copper. Of samples he had procured in Holland, four out of seven specimens contained sulphate of copper.

DR. W. J. RUSSELL was glad to find that copper did not deserve the bad character which had been given to it, as they were all aware of the extreme usefulness of this metal for cooking purposes and in the arts.

THERAPEUTIC ACTION OF ERGOTIN.

DR. ELLINGER has published (*Nederlandsch Tijdschrift voor Geneeskunde*, July 4, 1891) the conclusions he has arrived at after a series of experiments with ergotin as a hæmostatic and oxytocic. The commonly-accepted opinion is that the drug produces a contraction of the arterioles, thus causing cessation of hemorrhages, while by inducing anæmia of the cord in the same manner, the uterine centre is irritated, and uterine contraction ensues. Ellinger's opinion is that ergotin induces no vascular contraction, but that it acts directly on the peripheral uterine ganglia. His experiments further show that while dyspnœa acts as a powerful uterine peristaltic, after division of the cord this action is in abeyance; ergotin, however, in large doses, after division of the cord, induces uterine peristalsis. The uterus thus has an extra medullary centre on which ergotin exercises a special action; and he further demonstrates this by its effect on excised portions of uterine muscle in NaCl solutions at blood heat. He proves experimentally that in curarized rabbits dyspnœa acts by irritating primarily the cerebrum, and that the irritation is conducted by the medulla to the periphery, and he concludes that the path of the impulse in all probability is from the centre for the genitalia in the cerebrum, through the cerebellar peduncles, through the cord between the lateral and posterior columns, and in close juxtaposition to the central canal, leaving the cord at the tenth dorsal vertebra. The vagus acts as an inhibitory nerve to uterine contraction,

while the splanchnic nerves indirectly exercise an influence by their action on the uterine vessels. This explains why dyspnœa exercises no peristaltic action on the uterine fibres when the cord is cut, and elucidates the apparently diverging results of Wernich and Röhring. As to the blood pressure effects of ergotin, this is declared by Holmes, Vogt, Köhler, Eberts, and Wood to be raised, while Madelin, Borescha, and Herzmann and Wernich as confidently assert that it is lowered. Markwald alone says that he can find no definite type in the ergotin curve whereby one could say whether the blood-pressure is raised or lowered. Ellinger's experiments go to show that the variations in the blood-pressure curve are due entirely to the reflex action of the uterine and vaginal contractions on the vascular centre. Since then ergotin does not appear to have any direct effect on the blood-pressure, how are we to explain its hæmostatic action? He experimentally demonstrates that ergotin must have a specific action on the blood itself, whereby coagulation is more easily induced at susceptible points in the vascular cycle.—*British Medical Journal*, August 22, 1891.

HELENINE IN THE TREATMENT OF LEUCORRHŒA.

Helenine has already been employed in therapeutics in affections of the respiratory passages, in tuberculosis, in infantile diarrhœa, in diphtheria, and whooping-cough, while the ancients maintained that the root of the inula was a tonic and diaphoretic. Helenine is extracted from the root of the *Inula helenium*, or elecampane, a plant belonging to the family of the Synanthereæ. In addition to helenine, this plant also contains inulin, a sort of starch, which, however, has no therapeutic value. Crude helenine occurs under the form of a yellowish powder, slightly bitter, and of an agreeable odor. It is imperfectly soluble in alcohol, and is formed by the union of three substances,—a camphor (alantol), an anhydride (alantic anhydride), $C_{30}H_{50}O_4$, and a crystallizable principle (helenine), $C_{12}H_8O_2$.

In the *Journal de Médecine de Paris*, August 16, 1891, DR. HAMONIC publishes an account of some experiments which he has made as to the physiological action and therapeutic application of the crude and crystallized helenine. He states that the crystallized helenine is soluble in alcohol at ordinary temperature, and is extremely soluble when the temperature is raised to 37° C., the temperature at which all his hypodermic injections are made.

The author first tested the effect of this substance administered subcutaneously to white rats and guinea-pigs, and maintained that it is absolutely free from toxicity. Two grains of helenine may be injected under the skin of a rat without producing death, while 4 grains may be given to the guinea-pig without proving fatal, although suppuration was produced at the point of injection.

Dr. Hamonic employed helenine in cases of acute and chronic urethral catarrh, but with no satisfactory results, the affection even appearing to increase in intensity through its employment. The author maintained, however, that helenine seems to possess a specific action on the glands of the uterine cervix, and in consequence, when leucorrhœa is present, especially when combined with catarrhal endometritis, that helenine when given internally may produce entire cure without resorting to any local medications. He gives it combined with inulin and milk-sugar, in doses of ⅓ to ¾ grain in twenty-four hours. With the exception that occasionally this remedy produces slight diarrhœa and cramps, its use is free from any other unpleasant after-effects.

The author states that he has used decoctions of the root of the elecampane as a local application, but found that it was too severe an irritant to the vaginal mucous membrane to warrant a continuation of its use.

MEDICINAL PROPERTIES OF VEGETABLES.

Spinach has a direct effect upon the kidneys.

The common dandelion, used as greens, is excellent for the same trouble. Asparagus purges the blood. Celery acts admirably upon the nervous system, and is a cure for rheumatism and neuralgia.

Tomatoes act upon the liver.

Beets and turnips are excellent appetizers.

Lettuce and cucumbers are cooling in their effects upon the system.

Onions, garlic, leeks, olives, and shalots, all of which are similar, possess medicinal virtues of a marked character, stimulating the circulatory system, and the consequent increase of the saliva and the gastric juice promoting digestion.

Red onions are an excellent diuretic, and the white ones are recommended to be ea

raw as a remedy for insomnia. They are a tonic and nutritious.

A soup made from onions is regarded by the French as an excellent restorative in debility of the digestive organs.—*Journal of Balneology and Dietary*, August, 1891.

ACTION OF ADONIS VERNALIS IN DROPSY.

Adonis vernalis is said to have been introduced into the regular materia medica as early as the latter part of the sixteenth century, being mentioned by Hieronymus Tragus. Since that time it has frequently been described or recommended in pharmaceutical and medical works, and during the last ten or twelve years has formed the subject of numerous papers by British, American, and continental observers, among the most important of which may be mentioned those by Bubnoff of Professor Botkin's clinic, Cervello, Gluzinski, Huchard, Da Costa, Oliver, and Sergênko, of Kazan. These authors all agree in regarding adonis vernalis, or its glucoside, adonidine, as a heart-tonic and a diuretic, and as bearing more or less resemblance to digitalis in its action. A fresh work on the subject has just been published by Dr. A. N. Lavrovski, whose observations were made on ten male patients suffering from dropsy, who were kept in a ward together in the Alexander Hospital in St. Petersburg. The special object of this research was to discover the effect of adonis on the insensible loss from the lungs and skin in dropsical cases. For this purpose the observations were divided into three periods of several days each, during each of which the ingesta and egesta were carefully weighed and examined, and by that means, together of course with weighing the patients, the insensible loss could be accurately ascertained. It was found that not only did the drug, which was given in the form of infusion, act as a heart-tonic and as a diuretic, but that it also increased the insensible loss, which, however, did not equal the urine excreted. The action in both respects was somewhat slow in establishing itself, and when the drug was left off things very soon returned, more or less approximately, to their previous condition. The effect, however, was more prolonged in cases where the dropsy was of cardiac than where it was of renal origin. As a rule, it was found that the insensible loss was greater by day than by night. One or two examples may be quoted. A man with weak heart (*cor lassum*) had, before taking adonis, a daily insensible loss of 840 grammes; during the twelve days he took the drug his average loss was 885 grammes; and during the subsequent eight days 831 grammes. The mean daily quantities of urine passed in the three periods were 3056, 3247, and 2645 grammes respectively. In another and more serious case, diagnosticated as insufficiency of the aortic valves, with arterio-sclerosis and dilatation of the ascending aorta, the effects, both on the insensible loss and on the urine, were more marked, the average of the former being 802, 1127, and 892 grammes during the three periods respectively, and of the latter 1363, 2202, and 1814 grammes. In a typical case of chronic nephritis, the mean figures were, for the insensible loss 1250, 1592, and 1128 grammes, and for the urine, 690, 1541, and 1144 grammes for the three periods.—*Lancet*, August 29, 1891.

TOXIC GLYCOSURIAS, PARTICULARLY THAT PRODUCED BY URANIUM NITRATE.

Dr. François Cartier, as detailed in a Paris thesis, has found, in studying the toxic action of substances capable of causing the appearance of sugar in the urine, that there are in these transient cases of glycosuria striking points of resemblance to certain phases of diabetes as we find it in the human subject. All cases of poisoning which are accompanied by mellituria are, in fact, only ephemereal forms of diabetes, and if the cause be removed the effect disappears; glycosuria and diabetes are, in fact, different conditions, separated by unknown factors, and the conceptions of the etiology and pathogeny of this latter chronic malady has not appeared to us to be settled until the present time by the study of experimental glycosurias, but we may explain the symptomatology and development of diabetes, as we can obtain from toxic substances administered to animals a symptomatology comparable to the different phases of diabetes.

In the first part of this memoir the author passes in review the study of a number of chemical substances producing glycosuria. He reviews the experiments with the glycosides, phloridzin in particular, whose action shows a strong analogy to the benign form of diabetes. Then he devotes a chapter to the toxic action of many of the acids; he shows the physiological antagonism between the alkalies and the acids,—the former favoring the oxidation and destruction of sugar, the latter

preventing or retarding this oxidation and aiding the development of the diabetic condition. Experimentally, by poisoning animals with certain acid products, we develop symptoms analogous to those of diabetic coma. The third group of sugar-producing substances contain those substances which act directly upon the nervous system (strychnine, curare, morphine); their study proves the active part they take in the system in the production of diabetes.

It is by the study of those agents which exercise a distinctive action on the liver (phosphorus, arsenic, uranium, etc.) that we discover the slight value of hepatic alterations as a cause of experimental diabetes. No lesion or simple congestion of the liver has any direct relation to diabetes. The quantity of glycogen in the liver is independent of hepatic lesions, and depends primarily upon alimentation. With a toxic substance like uranium nitrate we may produce a grave hepatic lesion characterized by the formation of hyaline casts,—a condition which is present in other poisoned conditions, either natural or due to microbian toxines,—and yet, the ephemeral diabetes, which this salt produces, instead of increasing with the progress of the lesion, actually diminishes up to the time of death. Simple congestion of the liver can in like manner only be regarded as an accessory cause; for with the same metal, in very minute doses, we can prolong hepatic congestion for a certain number of days, yet the urine will cease to be diabetic after a little time.

In reviewing his observations of the agents causing the appearance of sugar in the urine, the author remarks that we may cause benign glycosuria with certain substances and malignant glycosuria with others, as there are both benign and malignant forms of diabetes. The gravity of experimental diabetes does not depend upon the amount of sugar present in the urine; a non-toxic substance like phloridzin may cause the excretion of as much as 50 grammes (1½ ounces) of sugar during twenty-four hours in the urine of a dog without killing it, and, indeed, without producing any but the lesser symptoms of diabetes,—polydipsia, polyphagia, etc. (Minkowski, by prolonging the action of phloridzin, was able, nevertheless, to induce a comatose condition. There were then found other products besides sugar in the urine, such as acetone and oxybutyric acid.) On the other hand, a strongly toxic substance like uranium gives hardly one per cent. of sugar and is immediately fatal. That which determines the gravity of an experimental glycosuria, then, is not the ephemeral glycosuria, but is the nature of the poison absorbed; it is, in fact, the poison itself which produces the histological lesions, and not the glycosuria. The toxic diabetes may diminish or, indeed, subside entirely under the influence of different causes,—fasting in the first place (except with phloridzin), nerve-section, ablation of the liver, condition of the temperature, the favorable action of a mild acid, etc.,—and the poison continue in force, manifesting its ordinary symptomatology.

Leaving the subject of experimental toxic glycosurias, and examining into the most recent work on the subject of diabetes, the author arrives at the following conclusions concerning diabetes itself: The danger in chronic diabetes lies not in the presence of the glycosuria, but in the presence of toxic substances derived from the sugar, which poison the organism, and which would themselves most probably produce the lesions, more or less inconstant, found at the autopsies of diabetic patients, not to mention the alterations in the nervous system, which may be caused by them or by the complications to which they give rise. When the diabetic patient is delirious,—a grave form,—and when he is cachectic, toxic products, such as alcohol, diacetic ether, acetone, lactic, acetic, diacetic, formic, crotonic, and beta-oxybutyric acids are always found in the urine. The final coma is but the accumulation in the organism of these toxic substances, which are cellular poisons that produce alterations in the excretory organs.

The renal lesions of diabetes have been produced experimentally with acetone; with sugar alone these alterations have never been produced! It would be no matter of surprise if these hepatic lesions were found to be dependent upon a secondary poisoning, as is the case in so many other general maladies. It remains to be proven whether diabetes is a unique malady, with various manifestations, or whether it is only a symptom resulting from various organic changes. For the present we are inclined towards the former hypothesis.—*The Satellite*, September, 1891.

LESIONS OF THE SKIN IN GONORRHŒA.

Leon Perrin has taken up this question, and, after discussing the influence of the gonococcus, concludes as follows: An impartial study of all the contradictory facts shows that, if at present we admit the etiological position

of the gonococcus in gonorrhœa,—if one can even assert that it is possible to discriminate it from other similar diplococci,—one cannot, from its absence from the blood, regard the remote phenomena, and in particular the eruptions seen in gonorrhœa, as due to the presence of this infectious agent in the circulation. One may hold, however, that gonorrhœa is, in the large majority of cases, a parasitic disease, which can occasion local phenomena (orchitis, cystitis, prostatitis), and remote ones (rheumatism, eruptions). The cutaneous phenomena are to be ranked among the exceptional localizations. The eruptions are polymorphic, scarlatiniform, morbilliform: they have no specific character nor such objective or exclusive features as to distinguish them from erythemata arising under the influence of other external or internal causes. Their pathogenesis is complex. Some are simple coincidences due to common causes, which should be carefully searched for. Others arise directly either from the gonorrhœa or the balsamic remedies. They may be thus angioneurotic erythemata, whose production has been determined by the effect of the gonorrhœa on the vasomotor system. Balsamic remedies, particularly copaiba, give rise usually to gastro-intestinal disturbances, but they may induce toxic cutaneous erythemata. They are not, however, directly pathogenic. It seems that it is necessary, in order that they may appear, that the soil should have been already prepared by the gonorrhœa.—*Edinburgh Medical Journal*, September, 1891.

ALKALIES IN UNIVERSAL PRURITUS.

Dr. C. Lange calls attention, in the *Hospitals Tidende*, No. 21, 1891, to the fact that most text-books present one with a most cheerless prospect in the section on universal pruritus. Arsenic internally and carbolic-acid compresses locally are the means most frequently relied upon. The writer has found a very prompt action in sodium bicarbonate combined with lithium carbonate in four cases of universal pruritus,—namely, in two ladies, of which two were over 50, and an old gentleman, in which cases the usual remedies had failed. The pruritus, in one case, in a 51-year-old lady, who was formerly well, and by no means hysteric, which had localized itself in the genital region, was so severe that her friends feared that she would either lose her mind or throw herself out of the window. She became emaciated and hollow-eyed, and presented pruritus of the entire body. Only hot compresses, as hot as could be borne, with large doses of chloral, would produce sleep. The administration of the alkalies mentioned, together with carbolic-acid compresses, improved her condition in a few days; in six weeks she was markedly better, but still required hypnotics and a compress at night. In three months no more hypnotics were necessary. In the urine of two other patients an abundant precipitate of uric acid and urates was found.—*Journal of Cutaneous and Genito-Urinary Diseases*, October, 1891.

RESEARCHES ON THE BILE.

A. Dastre (*Arch. de Physiol.*, p. 315, 1890, and *Centralb. f. d. Med. Wissensch.*, No. 30, 1891) finds that in dogs weighing nine to fourteen kilos (twenty to thirty pounds) the introduction of one hundred to two hundred and fifty grammes of ox-bile or one hundred and twenty to two hundred and thirty grammes of dog's bile into the stomach just before or one hour after the taking of food does not cause any disturbance of digestion or of the general condition of the dog. There is never vomiting, and at most the ox-bile causes purging. Five hundred grammes of boiled flesh were given to a dog with a gastric fistula, and one hour afterwards there were introduced into the stomach through the gastric canula one hundred grammes of ox-bile. A quarter of an hour afterwards the gastric contents were yellow in color, and the filtrate had an acid reaction and contained syntonin. The filtrate, when added to fibrin, rapidly dissolved the latter. An hour later the gastric contents yielded a clear fluid, also of acid reaction, containing peptone and pepsin. The introduction of large quantities of bile into the stomach is not accompanied by any disturbance or even slowing of the gastric digestive process. So rapid is the secretion of acid that the alkaline reaction of the bile is quickly neutralized. These results confirm those of Oddi, who found that when bile was discharged from the gall-bladder directly into the stomach, gastric digestion was not interfered with. With the view of studying the respective parts played by bile and pancreatic juice in the absorption of fats, Dastre made experiments on dogs, which were so arranged that only the upper half of the duodenum was moistened with pancreatic juice,—that is, only the pancreas discharged its secretion into this part of the gut, while into the lower part of the duodenum—one hundred and fifty centimetres below the pylorus—the bile for the

first time entered the duodenum. This was done by connecting the gall-bladder to the lower part of the duodenum and allowing the two to become united. The result was that the digested food, after leaving the stomach, was subjected to the action of the pancreatic juice alone in the upper half of the duodenum, while in the lower half it was in addition acted on by the bile as well as the pancreatic juice. After the animals recovered from the operation and had remained for months in good condition, they were given a plenteous meal of non-emulsified fat, and were killed by section of the bulb, or narcotized and their abdominal cavity opened. In every case the lacteals, as far down as the middle of the duodenum, were transparent, and they only became milky fifteen centimetres below where the bile was poured into the duodenum. It would seem from this that the pancreatic juice by itself is unable in the living animal (dog) to convert non-emulsified fat into an emulsion, but that for this purpose it requires the aid of the bile. This view seems to be confirmed by the results obtained in dogs with a complete biliary fistula,—that is, where all the bile was discharged externally,—for it was found that all the lacteal vessels were filled with a transparent fluid three hours after a hearty meal of non-emulsified fats. If, however, emulsified fats—for example, milk—are given to a dog with a biliary fistula, then, notwithstanding the exclusion of the bile from the intestine, the lacteals from the stomach to the middle of the large intestine are filled with a milky fluid.—*British Medical Journal*, September 26, 1891.

INFLUENCE OF MENTHOL ON THE GASTRIC FUNCTIONS.

Following Professor I. T. Tchüdnovsky's suggestion, DR. VLADIMÏRSKY, in a St. Petersburg thesis, has carried out a set of experiments on seven healthy subjects (six men, including himself, and one woman), aged from 24 to 32, the drug being administered with food, in the dose of .3, 1, and 2 grammes. The author has arrived at the following conclusions:

1. The drug (in any of the doses stated) very markedly diminishes the proportion of free hydrochloric acid in the gastric juice, the decrease attaining its maximum in about one or one and a half hours after the ingestion.

2. In persons presenting a more or less weakened motor power of the stomach, the decrease lasts longer than in those with a normal one.

3. The digestive power of the gastric juice is diminished.

4. The transformation of proteids into peptones is retarded (hence an increased proportion of propeptones,—*i.e.*, intermediary products of peptonization).

5. The proportion of lactic acid in the gastric juice is augmented, the rise proceeding parallelly with diminution in the proportion of free hydrochloric acid.

6. The motor power of the stomach grows weaker (in about one hour after the ingestion); in initial stages of the digestion, however, it may occasionally undergo some increase.

7. The absorptive power of the organ improves, which seems to be dependent upon a favorable (stimulating) influence of menthol on the circulation.

8. Contrary to the statements of Ossendowski (*vide* the *Journal of Laryngology and Rhynology*, May, 1890, p. 202), L. Braddon, M. Reichert, S. Rosenberg, Hugo Koster, and many other observers, menthol does not appear to possess any special "appetite-making" power.

9. In 1- and 2-gramme doses, the remedy gives rise to a kind of intoxication, followed, in four or five hours, by sensations of languor and drowsiness.

10. Menthol may prove useful as a substitute for camphor.—*Medical Chronicle*, August, 1891, and *American Journal of Pharmacy*, October, 1891.

ANTIPYRIN IN DIABETES INSIPIDUS.

Two years ago Dr. Opitz published (*Deutsche Med. Wochenschr.*, No. 32, 1889, p. 646) three cases of diabetes insipidus, which had been greatly benefited by the internal administration of antipyrin in the daily dose of from 2 to 6 grammes. Shortly afterwards Dr. I. I. Maslovsky, of Bürnak, described (*Philadelphia Medical and Surgical Reporter*, July 19, 1891, p. 79) a case of polyuria in a lad of 16, where substantial improvement had taken place under antipyrin and antifebrin. DR. ALEXANDER P. VOINOVITCH, of St. Petersburg, now reports (*Bolnitchnaia Gazeta Botkina*, Nos. 26 and 29, 1891, p. 665) a case of diabetes insipidus apparently completely and permanently cured by antipyrin. The patient, a retired artilleryman, aged 33, whose father and brother had died from diabetes mellitus, was suddenly seized with insatiable thirst and polyuria during a severe attack of epidemic influenza. T'

daily quantity of urine occasionally rose to thirteen litres. Antipyrin was given in .5 gramme doses from eight to twelve times a day, the administration being divided into three distinct courses (one of six days' duration, another of ten days, and the third of seven), with intervals of three and twenty-three days respectively. The patient was discharged in perfect health on the fourteenth day after discontinuing the treatment, the daily amount of urine excreted oscillating between six hundred and fifty and eleven hundred grammes, and the amount of drink taken averaging two thousand one hundred. He still remained well at the date of report (about twelve months after the discontinuance of the treatment).—*British Medical Journal*, September 5, 1891.

HYPODERMIC INJECTION OF MERCURY IN INFANTILE SYPHILIS.

MONCORVO and FERREIRA have reported in the *Revue des Maladies de l'Enfance* (t. ix. pp. 241 and 289) the results of an extended series of trials of the subcutaneous injection of mercurial salts in the treatment of infantile syphilis. The preparations used were calomel, yellow oxide, *huile grise*, salicylate, and corrosive sublimate. Of these, the *huile grise* and corrosive sublimate were found to be the most efficacious; neither gave rise to much pain at the time of injection, and there was little or no subsequent reaction. In making the injections, strict antiseptic precautions were observed. The treatment was exceedingly well tolerated, and in addition to the rapid amelioration of the cutaneous lesions and the somewhat slower disappearance of glandular enlargements, there was a very noticeable improvement in the general condition, as was evidenced by increase in weight and in the proportion of hæmoglobin in the blood. The dose of corrosive sublimate was 1 or 2 milligrammes; the ages of the children varied from 3 months to 14 years. The salt was simply dissolved in water. The dose of *huile grise* given is stated to have varied from "two-fifths to the whole of a Pravaz's syringe." The ages of the children ranged from 38 days to 12 years; the number of patients treated with the oil was thirteen; five were completely cured and seven were much improved. The injections were repeated every third, fourth, or fifth day, according to circumstances. The authors consider that the hypodermic injection of one or other of these mercurial preparations should be a recognized form of treatment in congenital syphilis, and should be resorted to when an immediate and powerful effect is desired. [The following is the note on *huile grise* in Martindale and Westcott's "Extra Pharmacopœia": "Injectio hydrargyri hypodermica,—*Syn.* Gray oil. Mercury 3, lanolin 3, olive oil 4. Preferable formula: Mercury 39, mercurial ointment 2, vaseline oil 59. Dose, 1 to 2 grains daily."]—*British Medical Journal*, September 26, 1891.

OZONE PHYSIOLOGICALLY AND THERAPEUTICALLY CONSIDERED.

According to the Paris correspondent of the *Lancet* (September 19, 1891), MM. LABBÉ and OUDIN recently communicated to the Academy of Sciences some interesting observations on the action of ozone. This action is best observed when the subject is placed in conditions which approach as nearly as possible to the natural production of the gas. When prepared chemically the ozone is found to be always more or less impure; consequently for experimental purposes it is best prepared by the electrical method. This can be easily carried out by passing a current of air between two tubes across which the electrical discharge is made to pass. In this way an animal may be made to inhale air containing one-eleventh to one-twelfth of a milligramme of ozone per litre without the least inconvenience. When the blood of an animal, which averages usually from ten to eleven parts per hundred of oxyhæmoglobin, has been examined after the animal has been submitted to the inhalations for a quarter of an hour, an augmentation of one in a hundred is found, and this is constant. On the other hand, when before the inhalations the amount of the oxyhæmoglobin is normal, a very feeble augmentation only is observed. This augmentation persists for from twelve to twenty-four hours; but if the inhalations be prolonged, the amount of oxyhæmoglobin will rise to the physiological limit. A highly interesting point is the observation recorded by the authors on the action of ozone on tubercular cultures. Two tubes containing these cultures were submitted to ozonic influence for some time, and then some of the fluid was injected into the cutaneous tissues of two guinea-pigs. Two other guinea-pigs were at the same time inoculated with another portion of the tubercular preparation which was not submitted to ozonic action. Now these latter animals succumbed to acute tuberculosis within twenty-five days, whereas the former

two showed nothing abnormal as to their condition of health fifty days after the experiment. Ozone has, moreover, according to these observers, another therapeutic property hitherto little, if at all, noted, and which, in their opinion, may lead the way to some important clinical results,—viz., its power of displacing and transporting the metallic substance of the electrode; and they found that this molecular displacement took place with all the metals.

THE CLIMATIC TREATMENT OF CHRONIC DIARRHŒA.

The climatic treatment of chronic diarrhœa was considered in a paper read before the American Climatological Association by DR. W. W. JOHNSTON, of Washington, D. C. (*Medical Record*, October 3, 1891). The observations and conclusions embodied in his paper were applicable not only to forms of chronic intestinal catarrh with diarrhœa, but to those also in which the discharges consist of mucus passed alone or in connection with more or less solid fæcal matter. These cases are often the most obstinate, and resist all efforts at home treatment. Two clinical varieties were considered,—first, the primary and simple form of chronic intestinal catarrh, with or without follicular ulceration, the type of which is the chronic diarrhœa of armies and prisons, observed also in civil life; second, a form most frequently met with in practice, more complex in its origin and nature; it is not primary, but is the outcome of prolonged ill-health characterized by chronic indigestion and various nervous phenomena. The causes are overstrain of the nervous system brought about in men by professional or business cares and anxieties, and in women by frequent child-bearing and a mother's many worries. The patient passes successively through the stages of gastro-intestinal indigestion, hepatic disorders, and constipation; there may be lithæmic, neurasthenic, or gouty symptoms, the stools sooner or later contain mucus, pure or floating in a watery fluid.

This complex disease can sometimes be cured by partial rest from work, by dietetic regulations and medicine. Often, however, only temporary relief, or failure, attend every effort, and radical measures, involving changes of residence and climate, become necessary and must be adopted. Travel is not to be recommended, as the inconveniences, discomforts, and fatigue either delay recovery or aggravate the disease. Ocean voyages are of no benefit except in mild cases. A prolonged residence in a suitable climate is the best procedure, and the locality selected should have the following conditions: 1, surroundings which give relief to mental care and supply pleasurable diversion; 2, an atmosphere which can give the greatest activity to the digestive processes; 3, meteorological conditions which will not lead to chilling of the surface or "taking cold"; 4, a warm, equable climate, which is generally a humid one, is not as beneficial as a cool and dry climate both in winter and summer; a dry, porous soil, a clear sky, with but little rainfall, add to these advantages. In summer, for severe cases, the Catskills, Adirondacks, or White Mountains; in winter, Western North Carolina, Northern Georgia, and other sections of the Appalachian chain fulfil the indications. Aiken and other similarly situated places are now better for those who cannot stand the cold of greater altitudes. He knew no reason why the high regions of the Rocky Mountain area might not answer as well, but based his paper only upon observations from personal experience and with Eastern climatic resorts. No published data as to the effect of this Western region, including Southern California, were accessible for reference or deduction. The paper was announced as only preliminary to a further and more extended consideration of a most important subject.

THE FREQUENCY OF THE LOCALIZATION OF PHTHISIS PULMONALIS IN THE UPPER LOBES.

DR. J. WEST ROOSEVELT summarizes an elaborate paper with the above title, which he read before the Association of American Physicians at its sixth annual meeting, with the following conclusions (*New York Medical Journal*, October 3, 1891):

1. The tubercle bacillus is found far more frequently in the upper than in the lower lobes of the lungs.

2. The pneumococcus, while it does not so often as the tubercle bacillus lodge in a particular part of the lung, nevertheless in about four-fifths of all cases of pneumonia the lower lobe of the left lung or the lower or middle lobe of the right is the seat of the disease.

3. Inhaled dust does not usually lodge first in the part of the lungs where the tubercle bacillus is found.

4. It is impossible to drive any fine powder into the air-vesicles after the lungs have been

removed from the body, positive pressure being employed.

5. The tubercular process involves the walls of the vesicles before the bronchi are affected, at least in a vast majority of cases.

6. Neither liquids nor solids in the bronchi are more often found in the upper than in the lower lungs. In bronchitis, acute or chronic, the secretion is found in the bronchial tubes proper and not in the air-vesicles, and it is no more abundant in one lobe than in the others. In cases of hæmoptysis, the blood rarely finds its way into the vesicles, and the particular set of tubes which contain the greatest amount of it is determined by the original seat of hemorrhage, the quantity of blood, the rapidity and duration of its flow, and the position of the patient. When the hemorrhage is so profuse as to expel most of the air from the larger tubes, as is the case when, for example, an aneurism of the aorta ruptures into the trachea, or a large branch of the pulmonary artery is the source of the hemorrhage, the blood fills the vesicles, but this occurs as a result not of the movements of respiration, but of the pressure of the effused blood propelled by the heart. This has no bearing upon the subject under discussion.

7. There is no evidence that the movements of the thorax affect any part of the lungs more or less in proportion to its bulk than any other part.

8. Among civilized people there is a marked difference between the sexes in the type of breathing. Women do not suffer from consumption quite so frequently as men; but consumption begins at the apices in about as many cases of consumptive women as it does in consumptive men.

9. The pulmonary artery and its main branches describe curves whose convexity is directed upward. The blood-vessels supplying the upper lobes are given off from the convex surface of the main trunks.

10. Small particles immersed in rapidly-moving fluid, when passing through curved tubes, are thrown against the outer wall of the tubes if the specific gravity of the particles is greater than that of the fluid. In the pulmonary arteries small emboli of greater specific gravity than the blood would tend to run along the upper side of the main branches and enter the trunks which supply the apices. If the particles are extremely small, or if they are large enough to occupy a considerable part of the calibre of the tube, this tendency is not so marked as it is in the case of particles whose size is sufficiently great for them to attain a momentum capable of overcoming the friction which the surrounding fluid exercises upon them, yet not great enough for them to be affected by the direct force of the current.

11. The contents of the lymphatics enter the venous blood through the thoracic ducts.

12. Tubercle bacilli can, and often do, pass through lymph nodes.

13. Cheesy matter is heavier than blood-serum.

The following statements are probably correct, but are not proved:

1. Tubercle seems to begin at the points where the pulmonary arterioles give rise to the capillary net-work.

2. Small masses of tubercle bacilli seem to have a greater specific gravity than blood-serum. (Such masses grown upon beef-peptone-agar were found by the writer to sink in a solution of common salt after the agar had been thoroughly washed off. The experiments were too few in number to be regarded as conclusive.)

DRAINAGE OF WOUNDS, WITH SPECIAL REFERENCE TO DRAINAGE AFTER URETHROTOMY.

Dr. Robert A. Kinloch terminates a paper with the above title, read before the South Carolina Medical Association, with the following conclusions (*Annals of Surgery*, October, 1891):

1. Urethrotomies for strictures of the penile portion of the urethra, including the meatus, require no artificial drainage. In case the urine is healthy, the natural passage of this is sufficient to prevent lodgement of blood or inflammatory exudates and subsequent decomposition, putrescency, and sepsis.

2. To insure against the action of un healthy urine, the secretion must be modified before resort to operation by the use of proper medicinal agents known to be efficient for this end. The bladder must also be treated as preliminary when its condition is such as to furnish diseased elements which give deleterious character to the urine.

3. If deemed necessary further to guard against the noxious character of the urinary secretions, the catheter *à demeure* must be resorted to for draining the bladder for forty-eight to seventy-two hours. The rigid English gum catheter is to be preferred to the soft rubber one, as less likely to be displaced.

4. After internal urethrotomies of the deep portion of the urethra, drainage is most essential. This cannot be properly secured by the mere use of the catheter, and therefore it is best to abandon such operation and to substitute for it a perineal section or external urethrotomy.

5. After this latter operation, drainage goes on securely, because of the direct external opening. It should, however, be more thoroughly insured by a *perforated* drainage-tube, reaching from the meatus, and made to project through the perineal wound; this is to be kept in place from three to five days.

6. Bladder drainage after perineal is not essential if the urine be healthy. By the voluntary efforts of the patient the urine flows readily from the bladder, and escapes through the perineal wound.

7. To better insure the escape of urine, however, through the perineal wound, and also prevent its contact with all lesions of the canal, a short tube, of large calibre and rigid walls, may be passed into the bladder from the perineal wound, and kept in position by a suture passed through the tegumentary edge of the wound. This tube may be removed after three days.

8. The use of non-irritating, antiseptic injections through the tube occupying the canal furnishes an additional precaution against sepsis. The bladder may also be easily washed out by means of the tube used for draining it through the perineum.

THE PRODUCTION OF IMMUNITY AGAINST, AND THE CURE OF, PNEUMONIA.

In 1890 was published the important discovery by Behring and Kitasato that blood-serum taken from animals that had been rendered immune to tetanus and diphtheria was capable of curing other animals suffering from those diseases. Drs. G. and F. Klemperer (*Berliner Klinische Wochenschrift*, August 24 and 31, 1891) published a research carried out in regard to pneumonia, with the object of discovering how immunity against the pneumococcus could be best produced, whether recovery from the disease rendered an animal immune, and whether it was possible to cure pneumonia by the blood-serum of animals that had recovered from the disease. Their experiments, which were confined to rabbits, revealed that every nutrient medium in which the pneumococcus has been cultivated will, if inoculated, render an animal immune against pneumonic septicæmia, even after the cocci have been removed by filtration. The power of producing immunity is more speedily acquired, and is increased if the infected nutrient medium (before or after removal of the cocci) is exposed to a temperature of between 41° and 42° C. for two or three days, or of 60° for an hour or two. In every case, however, it was found necessary that some interval (varying from three to fourteen days) should elapse between the inoculation and the production of immunity. Hence it was too late to cure a diseased animal, or even to prevent the onset of an attack, if the injection was given simultaneously with the outbreak of the disease. On the other hand, serum taken from animals enjoying immunity was found able, especially when introduced directly into the circulation, to cure pneumonic septicæmia. The serum was injected twenty-four hours after infection, while the animals had a febrile temperature of between 105° and 106.5° F. Eight cubic centimetres were injected, with the result that the temperature gradually sank during the next twenty-four hours. In twelve successive cases a successful result was obtained. This research, therefore, confirms, in regard to pneumonia in rabbits, what Behring and Kitasato did for tetanus and diphtheria. Drs. Klemperer next studied the question how the blood-serum of an immune animal cures an attack of pneumonic septicæmia, and discovered that when the pneumococcus is introduced into the body of an animal it generates a poisonous substance which can be isolated, and to which the name of "pneumotoxin" has been given. This pneumotoxin sets up a febrile condition which lasts several days, after which another substance is found to have been produced, called "antipneumotoxin," which is able to neutralize the pneumotoxin. The serum taken from an immune animal contains this antipneumotoxin, and it is by means of this substance that it cures an attack of pneumonic septicæmia in other animals. The relation of pneumonia as seen in rabbits with that met with in man was next investigated, and the conclusion arrived at that the disease in both cases is produced by the pneumococcus, but that the human body is much less susceptible to the latter than that of the rabbit. Thus it was found that serum taken from pneumonic patients after the crisis could cure pneumonia in rabbits; moreover, pneumotoxin and antipneumotoxin were found to be present in human serum as in that taken from rabbits. The crisis of pneu-

monia, according to Drs. Klemperer, takes place as soon as antipneumotoxin is produced in sufficient quantity to neutralize the pneumotoxin. Why immunity against further attacks lasts so short a time in man is still uncertain, but possibly less antipneumotoxin is formed in man than in rabbits in proportion to the pneumotoxin. Some attempts have already been made to cure patients suffering from pneumonia with the help of antipneumotoxin, but further observations are necessary before results can be published.—*British Medical Journal*, September 19, 1891.

THE TREATMENT OF DISEASES OF THE KIDNEYS.

In the *American Journal of the Medical Sciences* for October, 1891, DR. FRANCIS DELAFIELD publishes a paper on the classification of the various forms of kidney-disease, popularly called Bright's disease, which, in addition to many valuable facts bearing on the pathology of these diseases, contains numerous hints as to renal therapeutics. Dr. Delafield calls attention to the fact that acute congestion of the kidneys can be relieved by the application of heat to the surface of the body.

Chronic congestion is best managed by the drugs which stimulate the heart and dilate the arteries.

We evidently have no means at our command by which we can influence acute degeneration of the renal epithelium; fortunately, the great majority of the cases of acute degeneration are not serious.

Chronic degeneration also seems to be a condition which we are unable to treat.

In acute exudative and in acute diffuse nephritis the main indications for treatment are to diminish the severity of the nephritis and to regulate the circulation. To diminish the severity of the nephritis, we employ cups over the lumbar region, heat over the lumbar region or over the entire body, and the internal use of calomel, sulphate of magnesium, opium, aconite, or digitalis.

The disturbances of the circulation are largely the causes of the cerebral symptoms and of the dropsy. With a laboring heart and contracted arteries we employ the drugs which dilate the arteries,—chloral hydrate, opium, nitrite of amyl, and nitroglycerin,—or we diminish the quantity of the blood by venesection, sweating, or purging. With a feeble heart and relaxed arteries we use the cardiac stimulants.

In chronic nephritis, climate and mode of life constitute the important parts of the treatment; it is doubtful if drugs exert any effect on the nephritis. A warm, dry climate and an out-of-door life are of the greatest importance. Medical treatment can, however, be employed with advantage for the relief of the anæmia, the dropsy, and the disturbances of circulation.

INHALATIONS OF HYDROGEN DIOXIDE IN DISEASES OF THE RESPIRATORY ORGANS.

DR. GABRILOVICZ has employed inhalations of peroxide of hydrogen in cases of phthisis (*Gazette Médicale de Liège*). The patients presented all the symptoms of the disease (infiltration of the apices, bronchial breathing, râles, loss of flesh, night-sweats, occasional hæmoptysis, etc.). A solution of peroxide of hydrogen in water, in the proportion of 1 to 10 parts per hundred, was employed, the weak solution at the beginning. The inhalations were continued for several months. Six patients treated in this manner were greatly improved, the pulmonary symptoms being greatly ameliorated. The cough was relieved, the expectoration diminished, and in some cases the consolidation was reduced. Although the author's observations are limited, the results are certainly encouraging. Dr. Gabrilovicz thinks that inhalation of peroxide of hydrogen will prove very serviceable in the various forms of laryngitis, tracheitis, bronchitis, and also in the early stages of laryngeal and pulmonary phthisis. He also advises this treatment in laryngitis stridulus, whooping-cough, and asthma. In tubercular laryngitis it is best to commence with a five per cent. solution of the peroxide; in other diseases it is advisable to employ at first a one per cent. solution, gradually increasing the strength until the proper dose is reached.—*Dietetic Gazette*, October, 1891.

Reviews.

REPORT OF THE SECOND MEETING OF THE AUSTRALASIAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, HELD AT MELBOURNE, VICTORIA, IN JANUARY, 1890. Edited by W. Baldwin Spencer, M.A. Published by the Association, Royal Society's House, 5 Elizabeth Street, Sydney.

This Association has been founded upon the same lines as the British Association for the Advancement of Science, and its purposes and rules are practically the same.

It comprises ten sections,—1, astronomy, mathematics, physics, and mechanics; 2, chemistry and mineralogy; 3, geology and palæontology; 4, biology; 5, geography; 6, economic and social science and statistics; 7, anthropology; 8, sanitary science and hygiene; 9, literature and fine arts; 10, architecture and engineering.

It numbers among its members many of the most distinguished original investigators in all branches of science, and the proceedings of the various sections include addresses and papers which embody the latest advances in the extensive fields of science and art above mentioned.

The inaugural address of the President, Baron Ferdinand von Mueller, K.C.M.G., F.R.S., and Ph.D., etc., is a scholarly review of the achievements in the recent past in science and art, a forecast of what is yet to be accomplished, and an inspiring appeal for further progress.

Dr. Von Mueller, with his profound, yet deft and finished touch, pays a glowing tribute to the whole range of the sciences and arts, and we cannot refrain from quoting a paragraph from his peroration which is prophetic, in that he points out the questions that the future must solve:

"We are to enter soon on the last decennium of this century, that secular epoch which, to all human foresight, will remain the most expansive for discoveries in the world's history, because, it would seem, that in most directions not equal opportunities can re-arise for inventive foundation research within the same space of time. Shall we be in the proud position that other ages will say, 'The nineteenth century has done its work for science well'? and what can yet be accomplished towards its verge here and elsewhere? There will be some summing up then of the gain of human thoughts so far. Can the geographic chart of our planet be finished by that time? Can the telegraph-wires be connected throughout all countries? Can the outlines of the geologic map of our globe be completed? Can the systematic records of the faunas and floras be mainly brought everywhere to a close? Can an universal meteorology be evolved? Can chemistry exhaust then already the display of elementary substances and of their principal coalescences?

"What guides man in his high pursuit,
Opens, illumines, and cheers his way,
Discerns immortals from the brute,
God's image from the moulds of clay?
'Tis knowledge! and that to the soul
Is power, is liberty and peace;
And, while celestial ages roll,
The light of knowledge shall increase!"

A Clinical Text-Book of Medical Diagnosis for Physicians and Students, based on the Most Recent Methods of Examination. By Oswald Vierordt, M.D., Professor of Medicine at the University of Heidelberg, etc. Authorized translation from the second German edition, with additions, by Francis H. Stuart, A.M., M.D.

Philadelphia: W. B. Saunders, 1891.

"A preparation or a chemical reaction is not enough for a diagnosis, but the whole organism must always be brought under consideration. In other words, in diagnosis as well as in therapeutics, this rule is imperative: we must *individualize* the case." The plan of Vierordt's diagnosis is well stated in these words, and a book which helps to antagonize the inclination of our times to theorizing cannot but be an acceptable one. In fact, this work is one of the best which has been written on the subject, a judgment which is strengthened by the facts that the first German edition was exhausted in one year, and that it has already been translated into Italian and Russian.

The book is arranged on a most philosophical plan, and while teaching the student how to avail himself of the constantly-increasing finer methods of diagnosis, continually warns him against neglecting the simple use of the senses, especially the unaided eye. Nevertheless, Vierordt's work will be especially appreciated as the best manual for the teaching of the newer methods of study, such as the examination of the contents of the stomach and of the different pathogenic micro-organisms whose recognition is made possible by cultures and cultivations, the illustrations of the more important micro-organisms being printed in colors.

The translator has done his work well, though the style of his English would have been greatly improved by a less rigid adherence to the German original.

Therapeutics: its Principles and Practice. By H. C. Wood, M.D., LL.D., Professor of Materia Medica and Therapeutics in the University of Pennsylvania. Eighth edition, rearranged, rewritten, and enlarged.

Philadelphia: J. B. Lippincott Co., 1891.

When a text-book attains the position of Wood's "Therapeutics," commendation on the part of the reviewer becomes superfluous and criticism presumptuous. Scarcely three years have elapsed since the appear-

ance of the seventh edition, and yet the readers of the GAZETTE can readily appreciate that, to be abreast of the times, the preparation of this eighth edition has required great labor on the author's part, and that the result must practically be a new book; in fact, the author tells us that the preparation of the present volume has necessitated a careful study of more than seven hundred memoirs.

Every portion of the work has been thoroughly revised, and a number of the articles have been completely rewritten, while the newer additions to our Materia Medica have not been overlooked. Among those portions of the book that are practically new may be mentioned, as important, the whole subject of anæsthetics, a matter on which Dr. Wood's original work enables him to speak with authority,—the articles upon cocaine, strophanthus, caffeine, antipyrin, antifebrin, phenacetin, hydrastine, paraldehyde, lead-poisoning, etc. Among the entirely new articles may be mentioned sulphonal, chloralamide, aristol, and others.

Correspondence.

LONDON.

(From our Special Correspondent.)

The International Congress of Hygiene—A New Thermostat—Permanent Bacteriological Cultures—Extract of the Thyroid Gland in Myxœdema—The Diuretic Effects of Thyroid Juice—A New Treatment for Complicated Fractures—Tuberculosis in Cattle—Reputed Aids to its Diagnosis—Music as a Therapeutic Agent—The London Post-Graduate Lectures.

Another medical year has begun, and our hospitals are once more full of faces, new and old. This ought to remind me that an event so far back as the International Congress of Hygiene would belong by this time almost to history. I cannot pass this subject, however, without a reference to the very successful museum instituted in connection with the Bacteriological Section. It occupied two large halls in the London University, the one being devoted to exhibits of apparatus, incubators of most recent patterns, steam sterilizers, and instruments of all kinds required for the culture, etc., of bacteria; the other, under the direction of Dr. Armaud Ruffer and a committee of bacteriologists, being devoted to the display of cultures, microscopic specimens, and photographs of most of the known micro-organisms. Of the above exhibits, some deserve very special mention. A new incubator by Messrs. Hearson was made of copper, covered on the outside with a thick deal casing, and had doors in front of glass and wood. The regulator is also of a new kind, consisting essentially of a thin copper capsule, containing a few drops of a volatile liquid, boiling at or near the temperature desired, on which rests an arrangement of sliding weight and lever. The capsule is placed in the water-jacket, and by its expansion raises the lever, which, in turn, shuts off the gas-supply. By sliding the weight along the arm of the lever, the arrangement can be adjusted, so that the gas is shut off at a higher or lower temperature. I have seen one of these incubators working now for some months at 36° C., and I have never known the temperature to vary more than a small fraction of a degree. This is more than can be said for most of the thermostats now in use, and the wood casing is infinitely preferable to the old ones of dust-collecting felt.

In the other portion of the museum the exhibits suffered considerably, from the fact that there was no catalogue obtainable. Some, however, from their beauty, could not fail to attract attention. Such was the fine collection of preparations shown by Dr. Král, of Prague. These were characteristic cultures on gelatin, agar, potato, or parsnip, put up in sealed tubes or flat capsules, and so prepared as to be quite permanent, and thus form museum specimens with which future preparations may be compared. I have reason to know that Dr. Král did not take his collection away with him, but that, thanks to his generosity, one of our chief London laboratories now possesses this excellent "bacteriological museum." Besides these permanent preparations, there were growing cultures of, I think, all the described pathogenic and many of the purely saprophytic bacteria. Microscopic specimens, and, in many instances, photographs of these, were also to be seen, and the members of the committee had a pleasant, though by no means light, task in explaining to practitioners of the "old school," and to several visitors of the fair sex, how the microbes got on to the slides, and how it was that one could with safety handle tubes which contained many millions of anthrax bacilli kept in by only a cotton-wool stopper. I am afraid that space will not allow me to describe fully any more of the exhibits. One other, however, I cannot help noticing. This was a frame containing a

number of lantern transparencies, made by Lumière, of Lyons. Looking at these, one saw that they were a kind of micro-photograph ; but they were more than this, for they reproduced exactly the appearances of well-stained specimens, both as to color and form of the bacteria. How they were prepared no one seemed to know. I understand, however, that the photographic plates, after development and fixing, and while still wet, were in some way hardened by bichromate of potassium, when they presented all the appearances of a printer's block, after the manner of which they were colored. The result was a representation, far more accurate than any mechanical one, of what might be seen by the microscope.

At the annual meeting of the British Medical Association a very interesting paper, just published, was read by Dr. G. R. Murray on the "Treatment of Myxœdema by Hypodermic Use of Extract of Sheep's Thyroid Glands." The author was induced to make these experiments from considerations based on the results of some Portuguese surgeons, who found that, on introducing the fresh thyroid gland into the subcutaneous tissue of a myxœdematous patient (after the manner proposed by Horsley), very marked improvement commenced even on the day after the operation. This could not be due to the gland becoming vascularized, and so functional, but appeared rather the effect of absorption of the juice of the healthy gland. If this were so, similar beneficial results should follow injection of an extract of the thyroid without ingrafting of the gland itself. To test this, an extract was made from a perfectly fresh sheep's thyroid by the aid of glycerin and a .5 per cent. carbolic acid solution. The gland is cut up finely, and placed in a test-tube with 1 c.c. of glycerin and 1 c.c. of .5 per cent. carbolic acid. The tube is plugged and left for twenty-four hours in a cool place, after which the extract is obtained by expression, as a pinkish fluid, which should measure 3 c.c. This quantity of extract was used for a patient with well-marked myxœdema, in two equal injections, in the course of a week. After three months, during which five lobes of sheep's thyroid were used, the patient's condition was noted as very greatly improved. Œdema had to a great extent disappeared, speech was again almost normal, and the patient was able once more to enjoy life and take an interest in her surroundings. Treatment by this method would appear, therefore, to hold out great hopes of success, and Dr. Murray will presently, no doubt, give us the results of further experience. Possibly, also, he or some other worker may find out the chemical nature of the active substance in the glycerin extract.

The diuretic action of fresh thyroid juice has also been the subject of a note by Mr. Harry Fenwick, of the London Hospital. From observations of its action in two myxœdematous patients, he thinks that the juice of the thyroid gland has a powerful diuretic action. A similar action is exerted in cases of renal disease, but no effect is produced by the injections in cases free from kidney trouble. Mr. Fenwick obtained very marked improvement of his myxœdematous patients as a result of the injections. He thinks his experiments go to show that the usual theory of the action of the diseased thyroid in this malady is incorrect, and that the state known as myxœdema depends rather on perverted renal functions.

At the opening meeting of the Medical Society, Dr. Mansell Moullin read an interesting paper on a new treatment for severe complicated fractures, which, in his hands, has yielded very excellent results. His practice is to immerse the limb in a trough filled with an antiseptic lotion, kept at the temperature of the body. He begins by using a lotion of corrosive sublimate, of the strength 1 to 100, reducing it in a day or two to 1 to 10,000. As a rule, the immersions were kept up for an hour twice daily, but some cases were treated by almost constant immersion. The limb, in the intervals, is dusted over with iodoform. In thirty cases thus treated there was rapid disappearance of pain, together with reduction of temperature to normal. Successful results were obtained in all but two instances, although some had already developed marked inflammatory signs.

The early diagnosis of tuberculosis in cattle is a matter of undoubted importance, in view of the dangers resulting from the use of the milk or flesh of diseased animals as food. Some experiments have recently been made at the Royal Veterinary College to ascertain whether Koch's lymph would afford any aid in diagnosticating the disease in pigs and cows. The results do not seem encouraging, for, although a certain amount of general reaction followed injection into tuberculous animals, this did not increase in proportion to the dose injected. Healthy animals also showed themselves in many instances quite as sensitive to its action.

Another interesting series of experiments also emanates from the same source. It may be remembered that M. Mandereau, of Besançon, stated that the aqueous humor of tuberculous cattle constantly contains tubercle bacilli. This seemed rather remarkable, for one would have imagined that the eye thus affected could hardly fail to present considerable tubercular lesions. The control experiments at the Veterinary College were made on twenty animals, all manifestly tuberculous. In no single instance could the bacilli be detected in the aqueous humor, either by microscopic examination or by culture experiments. These results show again the danger of generalizing from few and uncontrolled observations.

A singular experiment is now being tried here by a band of musical devotees calling themselves the "Guild of St. Cecilia." Their aim is to test in every possible manner the curative powers of musical sounds, and they hope to be able to show that music can be a valuable handmaid to the physician and his prescriptions. It is thought that a stirring melody may arouse the lethargic, while a soft lullaby may possess powers which entitle it to a place among the more dangerous hypnotics. It is possible that all this may be true. Have we not scriptural authority in the story of David and Saul? At any rate their experiments are being watched with considerable interest, and the first big experiment carried out the other day at the Temperance Hospital was certainly striking in its results. The members of the guild placed themselves behind a screen at the end of one of the medical wards, and, with lowered gas-lights, performed soft melodies. After a time it was found that several patients had fallen asleep, others keeping awake only by an effort "because they liked listening." Even the physician, who was watching the experiment, said it was difficult to keep awake. A similar result followed repetition of the performance in a surgical ward, and here the anodyne effects were also plainly manifest. However the results are produced, whether by simple "suggestion," as the sceptics assert, or as the genuine effect of the music, they are none the less valuable, and the guild may be able to do much good in relieving mental depression or mitigating pain by distraction of the sufferer's attention. It is to be hoped that the interest aroused may assume a practical form, and, by filling the coffers of the guild, enable it to extend its sphere of usefulness.

English-speaking medical men will be interested to know that the Sixth London Post-Graduate Course has now commenced. Since their initiation these courses have been highly successful, and, judging from the number of doctors who come from all parts of Great Britain, India, the United States, and the colonies, they certainly fill a wide-spread want. Practitioners are glad to avail themselves of the opportunity of acquainting themselves with the most ancient methods of diagnosis and treatment, and a great many, especially Americans, have expressed their high appreciation. Similar courses in the continental schools have the disadvantage that they require the knowledge of a foreign language. This year, at the request of the practitioners themselves, a great increase has taken place in the number of subjects treated. There are now nine distinct courses, consisting altogether of one hundred and twelve lectures and demonstrations at the various hospitals.

Notes and Queries.

STENOSIS OF CERVIX FROM CAUTERIZATION.

Dr. Fraisse, of Roubaix (*Nouvelles Arch. d'Obst. et de Gynéc.*, July, 1891), owing to a terrible case in his own experience, warns the gynæcologist and practitioner against unskilful and meddlesome treatment of uterine disease. A similar case was recently reported by Fochier, of Lyons. A robust woman, aged 27, was taken with labor-pains at the end of her fifth pregnancy (exclusive of three abortions). The first stage was very lingering. On examination, the os was found to be smaller in circumference than a sixpence and perfectly undilatable, being almost completely surrounded by cicatricial bands of wood-like toughness. Only one-quarter of the border of the os was healthy. It transpired that about three months before this pregnancy the patient's cervix had been freely cauterized, and caustics of all kinds had been applied to the uterine cavity. Not only did impregnation occur, but the pregnancy went on without complication until labor. Drs. Godefroy and Fraisse found that the child could not be delivered until either the cervix was divided or Cæsarean section performed. Division of the cervix was almost impracticable owing to the high and backward position of the os. As the cicatri-

cial bands often involve the lower part of the uterus itself, section through them might produce deep rents into or even through the substance of that organ. The patient was left alone for a few hours, the attendants hoping that the os might yield. Violent labor-pains came on for an hour in the night and suddenly ceased, the patient appearing collapsed. Dr. Godefroy detected rupture of the uterus, with expulsion of the fœtus into the peritoneal cavity. The fœtal head no longer pressed on the cervix. The os was as rigid and undilatable as before. On the healthy quarter of the cervix—the portion free from cicatricial bands—the lower angle of a laceration could be felt; no doubt this represented the starting-point of the uterine rupture. The laceration ran obliquely backward and to the right. The patient, who was completely collapsed, felt no pain. Porro's operation was at once performed by Dr. Fraisse without anæsthetics. The fœtus was alive, the peritoneal cavity full of liquor amnii, liquid blood, and clots. The child died within a few minutes. The mother lived fifty hours. The previous cauterizations were the direct cause of the disaster. The rigid cauterized tissues of the cervix would not yield, so that the softer healthy tissue gave way during a violent contraction. Dr. Fraisse hopes that this example will warn those who persist in applying caustics to imaginary ulcers, and induce them to abandon that antiquated and barbarous practice. Dr. Godefroy adds to the above report the note of a case where the patient had pains in the perineum, evidently due to fissure of the rectum. An *officier de santé* insisted that uterine disease was present; he freely cauterized the uterus, and the patient died from the effects.—*British Medical Journal*, September 26, 1891.

THE KEELEY CURE FOR THE ALCOHOL HABIT.

The desire for stimulants, the love of strong drink, is indigenous in humanity, and the vice of drunkenness exists wherever man is able to gratify this natural appetite. Among all people where the results of fermentation are appreciated some alcoholic beverage is in common use, and aboriginal communities who are, or were, without the ingenuity to procure fermented liquors of themselves, as the American Indians and some of the Polynesian tribes, exhibit the same intense desire for their consumption as the rest of the human race. Thus it is that the vice of drunkenness—that is, the inordinate use of alcoholic liquors—is older than the history of the human family, and is as universal as the knowledge of fermentation and the ramifications of trade. But as the world grows wiser it also grows more moral, and the tendency of civilization is towards self-control. This vice, therefore, like all other elementary ones, is less to-day than it ever was before, despite the assertions to the contrary of numerous enthusiasts, and it will continue to grow less with or without the aid of "temperance" apostles.

But while this slow approach to virtue is pleasing to the philosopher and philanthropist, it gives no relief to the present army of drunkards and to the legion of other miserables who suffer because of them. Neither the prevalence of alcoholism nor the injuries wrought by it need be mentioned here; they are painfully evident to every medical man, and their restriction and relief appeal strongly to a humane profession. It is probably a feeling of reluctance to do anything that may hinder what seems to be an agent for good that has hitherto prevented professional comment upon the claims of DR. KEELEY in the treatment of alcoholism.

Dr. Keeley's method, briefly, is the administration of a patented nostrum, advertised to be the chloride of gold and sodium, with the hypodermic use, when the subject is under personal supervision, of what by its effect seems to be some mydriatic. Just what part the medicinal agents play in the reformation or, as Dr. Keeley prefers to call it, the cure of the patient is difficult to determine. Certain it is that many millions of drunkards were reformed or cured before Dr. Keeley existed, or the chloride of gold was known; and it is equally certain that at present the cure of drunkenness is being successfully accomplished without these agencies. One factor common to all methods of treatment, and without which Dr. Keeley's as well as all others is vain, is the determination of the patient to get well, the will power of the subject in the effort of cure. This effort of the patient has been of itself sufficient to cure very desperate cases in innumerable instances. It is of a kind with the "Mind" and "Faith" cures, which are notoriously efficient in many mental disorders, and when accompanied with the judicious administration of nervines, stimulants, and alteratives, may be expected to accomplish much. It cannot be denied that under the treatment of Dr. Keeley many persons, seemingly beyond the reach of help, have been rescued from their pernicious habit,

but neither can it be affirmed that Dr. Keeley's pathology, the basis of his cure, is tenable, nor that his double chloride of gold is in any sense a specific.

The factor in Dr. Keeley's method that deserves censure is the element of secrecy. The so-called double chloride of gold preparation is a secret nostrum, reserved by Dr. Keeley for his exclusive use and profit. This is of itself enough to justify a doubt in the good intentions of its proprietor, and this doubt is intensified by a contemplation of Dr. Keeley's business system. He always writes of his remedy with a capital "R" and his cures with a capital "C," and is in other ways given to display and exaggeration. He sells his medicine for home treatment at nine dollars for the brace of bottles that constitute the remedy, and, as a result, his profits are enormous and his income princely. Accepting the efficiency of his remedy at his own valuation, what is the position in which, as a humanitarian, he stands. Like a man standing on the banks of the flooded Conemaugh, reaching out his hands to the victims of the Johnstown disaster as they float helplessly by, and saying, "Give me nine dollars and I'll help you out. If you haven't got nine dollars you can go on down to certain and horrible death. There will be plenty of people float by here who will be glad to give me the money, and I cannot afford to soil my clothes and strain my arms for nothing." Such men are not encouraged by the medical profession.—*Pittsburgh Medical Review*, September, 1891.

POINTS IN URETERIC SURGERY.

Dr. Pezzer, in a paper read before the French Surgical Congress, which is reviewed in the *Union Médicale*, has called attention to some new sounds by which he practises permanent catheterism of the bladder. The instruments are made of pure rubber, so that they may be safely and thoroughly sterilized by boiling or steaming. They are constructed by M. Mathieu with a soft, elastic bulb at the extremity, which becomes effaced upon the introduction of a stylet and reproduces itself when the latter is withdrawn. The comfort with which these instruments were borne in the bladder caused Dr. Guyon to suppose that similar sounds might be left in the ureters after operations upon the bladder, and thus give the latter organ complete rest until cicatrization and healing had taken place. These small catheters have therefore been made, capable of retaining themselves in the ureter by the elastic pressure of their bulbs upon the ureteric walls. They were first used in dogs successfully, and afterwards by M. Guyon in the case of a young woman upon whom he had operated for tuberculous ulceration of the neck of the bladder. The experiment was altogether successful, and the case was reported to the Société de Biologie by M. Albarran, a student of M. Guyon's.

The report produced a contention upon the point of priority in the operation of permanent catheterism of the ureters, M. Poirier alleging that Pawlik, Segond, and he himself had each practised the method before M. Guyon. The facts in the case show, however, that these operators had left their instruments in the ureters for from thirty-six to forty-eight hours only, while M. Guyon had left his in for many days. If this latter fact does not constitute a new method, it certainly is a great improvement upon the earlier ones.

This question of priority, however, is of small moment compared with the startling observations that M. Poirier afterwards brought before the society upon this same subject of catheterism and injection of the ureters. He asserted that oil or grease injected into the ureter with a certain amount of force passed into the renal vein without any rupture of the kidney-tissue, and, *vice versa*, that the injection of oil into the renal vein shows itself in the ureter. These facts, says Poirier, should have been observed by all anatomists, but, lest it be objected that the occurrence is a post-mortem phenomenon, he has shown, he says, that water injected into the ureter of a living anæsthetized dog passes out in waves or jets through the renal vein. From these alleged facts one may be led to recognize the necessity of extreme caution in the practice of ureteric catheterism and injections, for the liquid may be forced back into the blood through the kidney-tissue, thus producing thrombosis or nephritis. Moreover, should the catheters become obstructed or be inadequate to the demands upon them, the retained urine may filter back into the blood, and thus cause systemic poisoning.—*New York Medical Journal*, September 5, 1891.

INCUBATION OF MEASLES.

Dr. H. Gillet relates (*Ann. de la Policlin. de Paris*, August, 1891) several cases in support of the view that the true period of incubation of measles is from eight to nine days, followed by a period of invasion lasting from

four to five days, so that the interval between infection and the eruption is from thirteen to fourteen days. In one of the cases the exposure to infection was for a limited part of a day only, and in this case the period of incubation was eight days, and the eruption appeared in the night between the thirteenth and fourteenth days. Dr. Gillet considers that any departure from these periods is rare, and the difference never great; he admits, however, the possibility of a period of nineteen days from infection to rash, but points out that even if so, a period of isolation of fifteen days would be sufficient to ascertain whether a child who had been exposed to infection would develop the disease, since the period of invasion is never less than four or five days, and therefore, even in cases of delayed development of the disease, the symptoms of invasion would be noticeable on the fifteenth day at latest.—*British Medical Journal*, September 19, 1891.

ON TAKING FLUID WITH MEALS.

A great deal of misapprehension is often found to exist in the popular mind in regard to matters of eating and drinking. The cause of this to some extent is to be traced to old-time sayings, which have come down to us in the form of a concentrated infusion of somebody's opinion upon a subject of which he or she was wofully ignorant. One of these misapprehensions to which we may refer is as to the injuriousness of taking fluid with meals. One frequently hears it laid down as a maxim that "it is bad to drink with your meals; it dilutes the gastric juice." By way of explanation we may remark that "it implies that the fluid taken is harmful." Whence this sagacious postulate originally came we cannot tell. It has quite the ring about it of an inconsequent deduction formed by a person whose presumption of knowledge was only exceeded by a lamentable ignorance of the subject. Medical men often find much difficulty in dealing with these museum specimens of antiquated science, for even educated persons are disposed to cling to the absurdities of their youth. Upon this matter Mr. Hutchinson remarks in the last number of his *Archives:* "I observe with pleasure that the verdict of general experience and common sense has been confirmed by scientific experiment in the matter of taking fluid with meals. Dr. Tev. O. Stratievsky, of St. Petersburg, after elaborate trials, has found that fluids materially assist the assimilation of proteids, and announces the following conclusion, which it is to be hoped no future experiments will controvert: on the whole, the widely-spread custom of taking fluids during or just before one's meals proves to be rational and fully justified on strict scientific grounds. To take fluids with the meals is almost as important an adjunct to digestion as is the mastication of solid food preparatory to swallowing it." It is obvious, however, that there is a limit to the amount of fluid one can swallow with impunity,—not to speak of comfort,—just as much with meals as at other times. It would be dangerous to create a general impression that fluid is good with food irrespective of quantity. It is, moreover, a well-ascertained clinical fact that an excess of cumprandial fluid does retard digestion in certain people, and gives rise to discomfort in most. A little attention to one's sensations in such matters will far better fix the desirable limit than all the "data" in the world.—*Medical Press and Circular*, August 12, 1891.

NOVEL TREATMENT OF INGROWN TOE-NAIL.

Dr. Puerckhauer recommends a novel and simple, and, at the same time, competent treatment for ingrown toe-nail: A forty per cent. solution of potassium is applied warm to the portion of the nail to be removed. After a few seconds the uppermost layer of the nail will be so soft that it can be scraped off with a piece of sharp-edged glass; the next layer is then moistened with the same solution and scraped off; this must be repeated until the remaining portion is as a thin piece of paper, when it is seized with a pincette and lifted from the underlying soft parts and severed from the other half. The operation does not require more than half an hour's time, is painless and bloodless, while the patient is delivered from his suffering without being disabled even for an hour.—*Memphis Medical Monthly*, October, 1891.

HOW TO TEST DRINKING-WATER FOR IMPURITIES.

Sometimes the physician is called upon to ascertain whether a sample of water is fit for drinking and domestic purposes or unfit for that end. It isn't a very difficult matter to apply a few tests for the simple determination of the figures or otherwise of a sample in question. A complete examination of the character of a sample of water is a very diffi-

cult problem and should be referred to a skilled chemist. The substances to be looked for primarily are organic matter, albuminoid matter, ammonia, nitrates and nitrites, and MR. FREDERICK J. WULLING, in the *Pharmaceutical Record* for October 8, 1891, gives a few simple methods for the determination of the presence of these bodies.

The nitrogen compounds are usually more abundant if animal matter is present; they, of all other abnormal constituents, render water the most unwholesome. Their presence, and also ammonia and albuminoid substances, do not necessarily render water unfit for domestic purposes, but water containing them, or either one, usually becomes the breeding-place of the germs of contagious diseases if they are around.

1. For organic matter, put a little of the sample into a beaker, add two or three drops of dilute sulphuric acid, and color distinctly with a solution of permanganate of potassium. If much organic matter is present, the color of the permanganate becomes discharged almost immediately; if less or very little, it takes longer to decolorize. If the color has not changed in twenty-five or thirty minutes, it is safe to assume that organic matter is not present. This is a tolerably reliable test.

2. For nitrites, a little sulphuric acid added to the water forms nitrous acid if nitrites are present, which is easily detected by its power of liberating iodine from iodide of potassium. A little starch paste is mixed with a small quantity of a solution of potassium iodide, and the mixture added to the suspected water containing the sulphuric acid. If nitrites are present, the nitrous acid formed liberates the iodine from the iodide, which turns blue with starch. This indirect method is a ready means for detecting the nitrites if present in not too small a quantity.

3. Nitrates are detected by converting into nitric acid, which turns morphine red. A portion of the water is evaporated to dryness, the residue treated with a drop of strong sulphuric acid (which makes nitric acid of the nitrite), and a portion of morphine added. If nitrates are present, the morphine gives a red color.

4. For ammonia, Nessler's reagent is by far the best test. It may be made by dissolving eighteen grains of oxide of potassium in a little water, adding solution of mercuric chloride until the red iodide of mercury first formed redissolves upon agitation. To this is added a solution of fifty grains of caustic potassium and distilled water to make eight ounces.

This reagent will detect .00375 of a grain in a pint of water by giving a yellow color. A reddish color or precipitate forms with larger quantities of ammonia.

5. Albuminoid matter requires a more elaborate proceeding for its detection. If all of the above were found, it is hardly necessary to go to the trouble of looking for albuminoids; the water would be unwholesome even if they were not present. If it is desired to test for them, nevertheless, Chapman and Waukly's test is the simplest to employ. If the water was found to contain ammonia, the latter must first be removed, as must also any urea that may be present. This is best done by distilling the water until it gives no reaction with Messler's reagent. Then add a strong solution of caustic potassium and potassium permanganate, and examine again for ammonia.

This test depends upon the fact that caustic potassium and permanganate of potassium cause animal matter, while still in an albuminoid condition, to unite with hydrogen to form ammonia.

It must not be understood that the tests just given are the only ones; on the contrary, there are a vast number, all more or less useful, for the determination of the quality of a drinking-water, but they are not all as practical and as easily applied.

AMMONIUM CHLORIDE IN EPIDEMIC INFLUENZA.

In a paper recently read before the Academy of Medicine in Paris, M. MARROTTE advocates the use of ammonium chloride in the treatment of epidemic influenza, in preference to quinine sulphate, as urged by M. Gellié, of Bordeaux. The results obtained from ammonium chloride are spoken of as highly favorable,—the advantages claimed for this remedy over quinine being that it is *much cheaper, more rapid* in its action, and brings about a *more complete* and *definite cure.*

It is more especially in those forms of the disease which are complicated with pulmonary congestion or inflammation that ammonium chloride is found serviceable. From 48 to 80 grains (3 to 5 grammes) are given in twenty-four hours in the form of 8-grain powders, which may be conveniently concealed in wafers.—*Merck's Bulletin,* September, 1891.

—THE—

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Original Communications.

*CLINICAL THERAPEUTICS—LECTURES ON THE TREATMENT OF HEPATIC AFFECTIONS.**

LECTURE IV.—ON THE BILIARY LIVER.

By Professor Dujardin-Beaumetz,† Paris, France.

GENTLEMEN:—In the last lecture I considered the liver from the point of view of the secretion of bile, and presented the most recent data of physiology on the biliary liver. I desire to devote this lecture to the therapeutic consequences which flow from the facts which I have stated.

I cannot attempt to take up all the problems connected with the therapeutics of the biliary passages, and shall speak of only three important points pertaining to this subject,—the treatment of biliary lithiasis; the new notions which have arisen respecting the different kinds of jaundice, and, in particular, infectious jaundice; and, lastly, I shall have a few words to say about urticaria of hepatic origin.

The treatment of biliary lithiasis was made the subject of very interesting and very important communications to the Congress which was held during April of the present year at Wiesbaden. On the one hand, the pharma-

* From advance sheets, revised by the author (translated by E. P. Hurd, M.D.). Lectures delivered in Cochin Hospital, Paris, France.

† Member of the Academy of Medicine, Physician to the Cochin Hospital, Paris, France.

ceutical treatment received the addition of a new medicament for renal colic,—namely, olive oil; and, on the other, surgeons, more sanguine than ever over their new antiseptic methods, claimed the ability to treat this disease still more successfully by a cutting operation. It is on the sum of these data, and on facts which you have been able to observe in my hospital service, that I base the exposition which I am about to make of the new treatments of biliary lithiasis.

In his remarkable report to the Congress of Internal Medicine of German physicians, Naunyn, of Strasburg, showed on what fragile bases all the chemical theories rest which have been invoked to explain the precipitation of cholesterin in the bile. Authorities have, in fact, maintained that, if cholesterin, which constitutes the basis of biliary calculi, undergoes precipitation in the bile, this results from an increase of the percentage amount of this substance in that fluid. This is not the case, for the experiments of Thomas have shown that cholesterin undergoes neither augmentation nor diminution in the bile, and keeps at an almost constant percentage figure, notwithstanding the kind of diet employed.

As cholesterin belongs to the fatty series, its increase in the bile, according to many authorities, is due to a diet too rich in carbohydrates, or, possibly, to an incomplete combustion of these carbohydrates. Hence, in logical accordance with this notion, they counselled the suppression of fats and other hydrocarbonaceous aliments from the food of individuals affected with gall-stones. To-day it is necessary absolutely to abandon this idea, and we shall see that if there is any special alimentary hygiene to be imposed on patients affected with biliary lithiasis, it should be established on other bases.

Other authorities in physiological chemistry, to explain the precipitation of cholesterin, have hypothecated modifications supervening in the bile. Thus it is that Thudichum has maintained that the decomposition of glycocholic acid into cholalic acid explains the setting free of cholesterin. Others have hypothecated the presence of calcareous salts. None of these theories have been verified by experiment.

There is even another view, which would derive cholesterin from the exaggerated functionating of the cerebro-spinal axis. We must make *carte-blanche* of all these theories, and base ourselves henceforth on clinical examinations. These examinations have shown us two great facts,—the one, which has been clearly set forth by Naunyn, that we always find as nucleus of the calculi epithelial *débris* shed by the mucous membrane of the altered biliary passages; the other fact, which, in my judgment, has not been sufficiently emphasized by Naunyn, is the stasis of the bile in the gall-bladder. Let us examine each of these facts.

The presence of epithelial *débris* as nuclei of the calculi is an evident proof that the latter are formed almost always as the sequel of an inflammation of the excretory bile-ducts, including the gall-bladder, an inflammation to which Naunyn gives the characteristic name of *desquamative angiocholitis*. Whence comes this angiocholitis? It results from the propagation of gastro-duodenal inflammation to the bile-ducts. We may even add that it is an *infectious* inflammation of these ducts, and I shall again return to this subject when I come to speak of infectious jaundice. And now, as for this gastro duodenal inflammation, whence does it arise? It results either from too abundant a diet, or from irritating articles of diet, or from the food being habitually badly masticated, and a sound alimentary hygiene will address itself to the different points which I have just mentioned.

Stasis of the bile in the gall-bladder is a cause of biliary calculi quite as important as desquamative angiocholitis; the one completes the other. First, angiocholitis prevents the free outflow of the bile, and consequently causes its stasis in the gall-bladder. Want of exercise, and especially wearing the corset, by immobilizing the liver, explains why we so frequently meet with biliary lithiasis in women. Lastly, irregularity of meals plays also a part in this retention of bile.

Do not, in fact, forget that in the physiological state, in each movement of inspiration we depress the liver upon the intestinal mass, and thereby exercise a pressure more or less energetic on the gall-bladder; and, as in the male, the respiration is chiefly diaphragmatic and inferior-costal, while in the woman it is chiefly superior-costal, if you add to this latter mode of respiration the use of the corset, you readily understand why biliary lithiasis is so frequent in women.

As for the influence of meals, physiology shows us that two hours after a meal the gall-bladder tends to empty itself.

It is, then, on these two bases—diet and exercise—that we must henceforth establish the hygienic treatment of patients affected with biliary lithiasis.

In respect to diet, we shall have to examine

successively the choice of foods, the interval between the meals, and the duration of the latter. As I have just said to you, in the choice of foods, you must abandon absolutely the proscription heretofore made to gall-stone patients of fatty and hydrocarbonaceous aliments. You will permit these articles of diet in moderation. But you will absolutely forbid all irritating ingesta, and as gastro-duodenitis always precedes desquamative angiocholitis as the cause of the calculi, you will endeavor to combat the first symptoms of this gastro-enteritis by a diet as simple as possible.

You will find the bases of this diet in a vegetarian regimen. Do not, in fact, forget that this duodenal inflammation follows an exaggerated acidity of the gastric juice, and that this acidity is itself produced by the abuse of azotized food. You will then resolutely interdict animal food, and subject your patients to a diet composed of eggs, amylaceous substances, green vegetables, and fruits, and if you permit meats, you will authorize only those that are well cooked and gelatinous.

In fact, to the inflammation, which is the cause of this angiocholitis, we must add the infection due to the penetration of the microbes of the intestine into the bile-ducts. Putrescible meats, as game, fish, mollusks, and crustaceans, being factors of this infection of the bile-ducts, should be absolutely proscribed. As for beverages, you ought to be uncompromisingly severe in the prohibition of all alcoholic stimulants, alcohol being one of the most frequent causes of gastro-duodenitis, and insist on the use of water or of milk; and to patients who cannot endure the complete suppression of alcohol, you will allow a little white wine diluted with water, or an occasional teaspoonful of good brandy in a glass of water.

Alkaline waters, which have so favorable an action in the treatment of biliary lithiasis, are here almost obligatory. There has been a great deal of discussion respecting the therapeutic action of these waters. We have seen in a previous lecture that the alkaline waters are not cholagogue. It is not, then, by the augmentation of the biliary secretion that we can explain their curative action. In my opinion their therapeutic effects must be attributed principally to the power which they possess of diminishing the gastro-enteritis by decreasing the acidity of the gastric juice.

It is not enough to have prescribed a vegetable diet, abstinence from alcoholic drinks, and the usage of alkaline waters, you must also require of the patient that he shall devote a sufficient time to his meals, so that mastication may be completely and slowly effected. Mialhe, many years ago, advanced the opinion that all kinds of dyspepsia were due to insufficient mastication. Without going to this length, we may say, however, that the presence of aliments badly masticated is one of the most frequent causes of gastro-duodenitis. The undigested bolus constitutes a veritable foreign body, which irritates the pyloric region of the stomach and the mucous membrane of the duodenum. It is the same with too great a quantity of any kind of food. Large, gluttonous eaters, who bolt their food, are very subject to gastritis. It is necessary to eat reasonably and to masticate slowly.

As for the interval between meals, it is desirable that the meals should be brought rather nearer together than in health, as we know that each meal aids the gall-bladder in emptying itself. You will then allow the patient, besides breakfast and dinner, to take a little food on rising and about three o'clock in the afternoon, so that he may have four meals a day,—two large ones and two small ones. Be it understood that this prescription does not apply to persons with dilated stomachs, who constitute (it must be acknowledged) a considerable percentage of gall-stone patients.

This fact—*i.e.*, the frequency of biliary lithiasis in patients affected with dilatation of the stomach—is easily explained, when we consider that they have often, besides gastritis, an irritation of the duodenum, and that very often there exists, superadded, an infection of the bile-passages, circumstances all of which are favorable to the development of desquamative angiocholitis.

So much for the dietetic prescriptions to be enjoined. They are, as you see, almost all based on the knowledge of the gastro-duodenitis and consecutive angiocholitis.

With regard to the stasis of the bile, you can combat this second cause by different means, some of which belong to pharmacy, others to hygiene. As for the pharmaceutical treatment, it is to cholagogue medicines that you should resort, and I would recommend to you especially euonymin and salicylate of sodium.

I was one of the first to make known the favorable action of euonymin, and my first trials were recorded in the thesis of one of my pupils, Dr. Davet.*

The formula which I ordinarily employ is as follows:

* Davet, *Thèse de Paris*, 1880.

Euonymin,
Castile soap, aa 10 centigrammes.
For one pill.

The ordinary dose would be two pills.

Salicylate of sodium is also a good cholagogue, and I often administer to patients affected with biliary lithiasis a dessertspoonful after meals of the following solution:

℞ Salicylate of sodium, 15 grammes;
Water, 250 grammes. M.

Salol, associated with salicylate of bismuth, is also a powerful cholagogue. You can use the formula of my antiseptic intestinal *cachets*, which is as follows:

℞ Salol,
Salicylate of bismuth,
Bicarbonate of soda, aa 10 grammes. M.
Sig.—Make into thirty medicinal wafers (*cachets médicamenteux*).

Laxatives also play an important *rôle* in the treatment, and you can employ podophyllin or cascara, or the sodic-sulphate purgative waters, such as Rubinat, Villacabras, and Carabana.

Lastly, do not forget that large rectal injections have a cholagogue action; this is Krüll's method. You can here make use of enteroclysm and the naphthol solutions of which I have spoken in a previous lecture.

Next come the hygienic methods. I have said that respiration favors the flow of bile, by depressing the liver upon the intestinal mass, and thereby exercising pressure on the gall-bladder. You should, then, make your patients take full, deep inspirations, and for this purpose you cannot do better than recommend respiratory gymnastics. One of the most simple methods of carrying out this kind of gymnastics consists in making your patient count in a loud tone of voice without taking breath.

It is well understood that in the case of your female patients you will make the sometimes difficult requirement that they shall wear their corsets rather loose, while men should be interdicted in the use of the waistband and the wearing of tight suspenders. Lastly, long walks and other bodily exercises, by energizing the respiratory movements, are powerful adjuvants to this kind of treatment.

In the performance of these exercises a real massage of the gall-bladder is produced. One may also, with the hand, and by following the practices which I have set forth in my "Hygienic Therapeutics," in the lecture on "Massage" (see THERAPEUTIC GAZETTE, 1887, p. 577), accomplish, by the aid of abdominal massage, a direct pressure over the base of the gall-bladder.

Lastly, hydrotherapy, in giving to the muscular system a better tone, should be advised in these cases.

Such are the general rules and principles that you should follow in the treatment of biliary calculi. You know, however, that this treatment comprehends two great indications,—first, to oppose the production of calculi; then to combat, not their expulsion, but the painful symptoms that accompany them, and whose sum constitutes what has been described under the name of hepatic colic.

I have accomplished the first part of my task, and I will now take up the second,—*i.e.*, the treatment of the painful phenomena which constitute the hepatic colic. I shall review only the principal points pertaining to the subject, referring you for a more complete exposition thereof to my "Clinique Thérapeutique" (*vide.* "Diseases of the Liver," American edition). It is now an accepted fact that one of the best means of combating that reflex spasm which has for its origin the irritation of the mucous membrane of the bile-ducts is the injection of morphine. In these cases you can make use of the combination of morphine and atropine, as in the following formula:

℞ Sulphate or hydrochlorate of morphine, 10 centigrammes;
Sulphate of atropine, 1 centigramme;
Sterilized water, 20 grammes.

The dose of the above would be one hypodermic syringeful.

But I desire to call your attention particularly to a new medicinal agent. I refer to olive oil. It is to the homœopathic physicians, who have, it must be admitted, introduced a number of new medicines into the materia medica, that we are indebted for our knowledge of the utility of olive oil given in large doses as a remedy for hepatic colic. It is now almost twenty years that this treatment has been in vogue. In recommending olive oil in this affection, it might seem that they were in part faithful to their doctrine, in combating gall-stones constituted essentially by cholesterin, a fatty body, by another fatty body,—*similia similibus.* At the same time note that they employed it in large doses, which is hardly consistent with the Hahnemannian doctrine.

From the United States, this method passed

over to England, and was there adopted by several regular physicians, and among them Kennedy, Thompson, and Singleton Smith.

In France, it was not till after the publication of Touâtre, in 1887, that we commenced using this remedy, and Chauffard and Dupré, in 1888;* Martial Durand, of Bordeaux, in 1889;† Huchard,‡ Germain Sée,§ and Marciguey,‖ in turn published favorable results.

All these clinical facts have, moreover, been summed up in an excellent paper by one of my pupils, Dr. Willemin,¶ of Vichy, from which I borrow the more important points respecting this mode of treatment.

To-day the facts are sufficiently numerous to warrant us in affirming that olive oil in large doses is one of the best means of combating the painful phenomena determined by the presence of calculi. It arrests almost instantly the severe acute pains, and diminishes considerably the period during which the patients suffer dull pains, prostration, and discomfort.

Failure constitutes the exception, and what is strange, the large quantity of oil is well borne and the patients do not vomit. I say large quantity, for you must give in one dose 200 grammes (or nearly a tumblerful) of pure olive oil, and, in order to do away with its disagreeable taste, you can order the patient to rinse the mouth with brandy and water, or to suck a little orange juice. In my own practice, to the olive oil I add bile, and with two hundred grammes of oil I combine twenty grammes of ox-gall. This mixture is slightly bitter, but it is well tolerated by the patient, and the results have been the same as with the oil, so that it is difficult for me to credit to the bile what really belongs to it in these cases. I was led to employ ox-gall by the researches of Prevost and Binet, who have shown that this substance is a powerful cholagogue.

We are still ignorant of the real mechanism of the therapeutic action of olive oil. Touâtre maintains that the oil always causes expulsion of the calculi. We know to-day the cause of this mistake. Touâtre confounded with gall-stones certain oily concretions resulting from the incomplete digestion of the ingested oil.

It is difficult to admit that the oil acts directly on the calculi, for we cannot conceive of its passing into the bile-ducts. Stewart maintained that the oil broke up into fatty acids and glycerin, and that the latter produced in the intestines reflex movements favoring the issue of the calculus. Others, and in particular Rosenberg, considered the oil as a powerful cholagogue, and it is this cholagogue action which explains the favorable effects of the oil.

Lastly, we may suppose that the oil has a direct action on the orifice of the ductus communis choledochus and corresponding duodenal region, which tends to diminish the reflex spasm, which is the first cause of the colic.

For my part, I am ready to adopt the opinion of Willemin, who thinks that the large doses of oil act in several ways,—first, as a cholagogue, then in diminishing the reflex action, and lastly in favoring the descent of the calculus into the intestine by their laxative properties.

However this may be, the number of favorable facts is to-day so considerable that, before having recourse to the injections of morphine, you ought always to make your gall-stone patients take a full dose of 200 grammes of olive oil, with or without the addition of the ox-gall.

It remains for me, in concluding, to say something about surgical intervention in cases of biliary lithiasis. Fortified and protected by antisepsis and asepsis, abdominal surgery has taken of late years a very wide extension, and operations are now performed on the liver which years ago were never thought of. Surgeons have freely opened abscesses of the liver. They have even resected portions of the organ; but the most brilliant operations have been performed on the gall-bladder, which has sometimes been cut open for the extraction of gall-stones (cholecystotomy), sometimes completely extirpated (cholecystectomy), a much more dangerous operation than the other.

The first attempts of the kind, made by Lawson Tait and Langenbeck, were so successful that these operations became popular, and were performed by surgeons in different countries; and in France the cases on record, by Terrillon, by Terrier, by Routier, and by

* *Bulletin de la Société Médicale des Hôpitaux de Paris*, October 24, 1888.

† Martial Durand, *Société Médicale de Bordeaux*, January 25, 1889.

‡ Huchard, *Revue de Clinique et de Thérapeutique*, December 3, 1890.

§ G. Sée, *Médecine Moderne*, January 23, September 11, and November 6, 1880.

‖ Marciguey, *Revue de Clinique et de Thérapeutique*, 1889.

¶ Willemin, "Traitement de la colique hépatique par l'huile d'olive" (*Bulletin de Thérapeutique*, t. cxx., 1891, pp. 241 and 308).

Perier, are sufficiently demonstrative to entitle these operations to a legitimate place in current surgical practice. Therefore, whenever, whether, by reason of a calculus or some morbid alteration of the bile-ducts, there exists an insurmountable obstacle to the outflow of the bile, and the latter accumulates in the gall-bladder and distends it so as to constitute a tumor which is sometimes mistaken for hydatid cysts, the duty of the physician is to call in the help of surgery to obtain the definite cure of the patient; and such surgical intervention will be in the great majority of cases followed by success.

I need not here give you the details of these surgical operations, but will refer you, therefor, to the new treatises on surgery, and it will be hard for you to find anything better on the subject than the recent article of Terrillon in the *Bulletin de Thérapeutique*.*

I have now finished what I intended to say on the treatment of biliary lithiasis, and I will now take up as briefly as possible the question of infectious jaundice.

To the chapter, already so extensive, of icterus in general must be added a new branch of medical study, which has come into being the last few years; I refer to infectious icterus. Guided by the new methods of investigation instituted by Pasteur, pathologists have sought to determine whether the bile contains micro-organisms or not, and in what way the latter may enter the bile. They have established the clinical symptomatology of this hepatic infection, the clinical syndrome that results therefrom, and have arrived at conclusions which concern clinical medicine and therapeutics.

You will find all these data set forth in their entirety in a very able thesis by Dr. Ernest Dupré.†

Bile, in its normal state, is devoid of microbes, and this, despite the presence of numerous micro-organisms existing in a permanent state in the duodenum and even as far as the ampulla of Vater; but in the pathological state the barrier there interposed is broken through, and the bile is then infected by numerous pathogenic microbes.

This infection may take place, as Dupré remarks, in five ways,—by the lymphatics, the arteries, the venous channels, and the bile-ducts.

Infection by the lymphatic vessels is extremely rare. As for infection by the hepatic artery, this sometimes takes place as a sequel of general pyæmia; this is the cause of abscesses of the liver, so frequent in purulent infection.

Infection by the vena portæ is the cause of the abscesses of dysentery. As for infection by the hepatic veins proper, it is very rare. Nevertheless, Widal, Achalme, and Claisse have reported several cases.

There remains the infection by the bile-ducts, which possesses by far the greatest interest, and which alone deserves to occupy our attention during the remainder of the lecture. Dupré has classified the biliary infections into primary and secondary, and the table which I here give you from his work is a good *résumé* of the divisions which he has adopted:

BILIARY INFECTIONS.	Primary.	Acute.	Spontaneous, protopathic (series of infectious icterus).
		Chronic.	Provoked, deuteropathic (biliary infections complicating general affections).
			Chronic forms of icterus.
	Secondary.....	Intrinsic obstructions by	Foreign bodies (inert and living).
			Calculi.
			Cancer.
		Extrinsic obstructions by	Tumors of the duodenum, of the pancreas, of the hilum of the liver, etc.

I cannot enter into a symptomatic detail of all these forms of icterus, but I must, however, call your attention to a primary, acute form, which is to-day designated under the name of Weil's disease, and which you will find described in a fine paper by Lancereaux,‡ a description which was written before the publication of Dr. Weil in 1886,§ as the article of Lancereaux bears date 1882.

Whether it be primary or secondary, the biliary infection gives rise to an aggregate of symptoms, of which fever is one of the most constant characters.

This fever is sometimes remittent, sometimes frankly intermittent, and it then presents the three stages of intermittent malarial fever. The accessions may even take

* Terrillon, "Chirurgie du foie" (*Bulletin de Thérapeutique*, t. cxx., 1891, p. 108).

† E. Dupré, "The Biliary Infections: a Bacteriological and Clinical Study" (*Thèse de Paris*, 1891).

‡ Lancereaux, "Des Ictères graves et des hépatites parenchymateuses," Leçon de la Pitié (*Revue de Médecine*, 1882).

§ Weil (Heidelberg), "Ueber eine eigenthümliche mit Milz Tumor, Icterus und Nephritis einhergehende acute Infectionskrankheit" (*Deutsche Klinische Medicin*, 1886, Band xxxiv. p. 209).

on the grave and pernicious form, and the patient succumbs during one of these attacks.

Against these forms of infectious icterus, whatever may be the origin, we are not altogether without therapeutic armor. It is especially to the antiseptic medication that you are to resort, and here you will witness the signal benefits of salol, of salicylate of bismuth, of intestinal irrigations with naphthol, and of an appropriate diet, of which milk should be the basis.

Do not, in fact, forget that in these patients we find a favorable prognostic indication in the abundance of the urine. The greater the amount of the urine voided in twenty-four hours the greater the chances of recovery; and you will obtain this diuretic action by making almost exclusive use of a milk diet. If I do not enter more into the detail of this antiseptic medication, it is because it is precisely like what I have before described.

Nevertheless, there is a medicament which should occupy an important place in the treatment of these cases of infectious icterus. In the previous lecture I showed you that on the experimental plane calomel is not a cholagogue, and the experiments of Prevost and Binet entirely confirm those of Rutherford and Vignal. The latter had proposed to substitute the bichloride of mercury for the protochloride; but, according to the Genevan experimenters, neither of the two salts of mercury can be considered as cholagogue.

At the same time, clinical medicine has shown all the benefits to be derived from calomel in certain hepatic affections, and in some countries, as in the United States and England, this medicament is in current use. I believe that we must explain the good effects of calomel in the treatment of hepatic affections by its antiseptic properties. It is a powerful microbicide, and you understand how, in the infectious hepatic affections secondary to intestinal affections, this medicament may render great service. Dr. Sacharjin has much vaunted the employment of calomel in such cases. He gives it in fractional doses of 1 centigramme (1/6 grain) seven times a day.*

At the same time I prescribe calomel with great moderation, for this reason, that I have sometimes seen patients salivated by its use.

You know that it is to-day demonstrated with almost absolute certainty that the transformation of calomel into corrosive sublimate under the influence of aliments containing common salt is much more difficult of production than was formerly thought. Hence we are not obliged to eschew the use during the administration of calomel of food that has been salted. With regard to the doses, you will have better results by giving massive doses of 7 to 15 grains, taking care always to watch the gums of your patients. You will, of course, cease giving the medicine if the least symptoms of gingivitis appear.

It remains for me, in concluding this already too long lecture, to say a few words about urticaria of hepatic origin.

You are all acquainted with urticaria of alimentary origin, whose most intense type is that which is observed after the ingestion of certain kinds of shell-fish, as clams and oysters. It has been affirmed that these urticarias are produced by a toxic substance contained in the liver of these mollusks, a toxine which Brieger has isolated, and to which he has given the name of *mitylotoxine*.

You know also that the same phenomena of poisoning may supervene after the puncture of hydatid cysts, and that it is probable that it is another toxine not yet isolated which causes this urticaria.

The same rash is seen in the period of convalescence of infectious icterus, and in particular of icterus by retention become infectious. At the moment when the bile is again poured into the intestine, eruptions of urticaria of great intensity are witnessed. These urticarias last a certain time, gradually fading away, to disappear altogether as the individual regains his health.

I explain these forms of icteroid-urticaria in this way: It is probable that the bile retained in the infected liver is the starting-point. This bile contains a great number of microbes and toxines, similar to those which develop in the liver of shell-fishes. This bile, which is poured in abundance upon the surface of the intestine at the moment when the obstacle is overcome, is reabsorbed, and then causes phenomena of poisoning, of which the nettle-rash is one of the manifestations.

Here, also, the only treatment of any use is intestinal antisepsis, which is applicable not only to these urticarias consecutive to infectious icterus, but to the greater part of urticarias in general, which are pathogenetic eruptions, as Bazin calls them,—*i.e.*, are dependent on blood-poisoning, whether of alimentary origin (as is generally the case) or of medicinal origin. To-day the physicians

* Sacharjin, *Berlin. Klin. Wochenschrift*, 1891, No. 25, p. 604.

of the School of St. Louis Hospital go so far in the treatment of urticaria which is very intense, whatever may be its source, as to prescribe an exclusive milk diet.

Such are the considerations which I wished to present relative to the subject of the biliary liver. The hepatic affections are many, and you will, I hope, find in the facts which I have stated practical indications for their treatment. In my next lecture I shall take up the glycogenic liver.

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*THE RESULTS OF THE SHURLY-GIBBES TREATMENT OF TUBERCULOSIS AT ASHEVILLE, N. C.**

By H. Longstreet Taylor, A.M., M D.

LAST spring I began the use of hypodermic injections of iodine and chloride of gold and sodium, with the inhalations of chlorine gas, in the treatment of laryngeal and pulmonary tuberculosis, and while in a few months' time it is impossible to form a decided opinion as to the ultimate results of the treatment, yet the first results are apparent and should be reported to the profession. Permanent results can only be claimed when years have elapsed without any active symptoms showing themselves. Relapses in tuberculosis are like recurrences in cancer, each one makes the case more and more hopeless, just as the absence of either is good cause to hope that the case is cured, which hope becomes stronger, until after the lapse of at least three years the case can be looked upon as cured. As the percentage of cures after operations for cancer is low, so is it in consumption, when the three years' limit is applied; and the earlier either disease is attacked scientifically the greater the probability of a fortunate outcome. The profession is for some reason unaccountably backward about insisting upon the necessity of this in both cancer and tuberculosis. The advice is given to come back if that lump in your breast gives you any trouble, thus robbing that woman of her only chance for life; and the diagnosis of tuberculosis is only too often withheld, until the suspicions of the sufferer wring it from his physician, or send him to another who may be more candid. This is a fatal error, for the intelligent co-operation of the patient is necessary in the earliest stages of consumption, and to call it bronchitis or catarrh is as much a mistake as to pay no attention to a lump in a woman's breast. It is only in the beginning that scientific treatment can avail in either case, and every one should be given the advantage of it. As long as cancer is local, the surgeon attacks it with hope and confidence; as long as infiltration is confined to a small area in one lung, proper management can do much for the consumptive. No plan of treatment ever has or ever can be instituted that will cause extensive infiltration to disappear, or that can make a well man out of a tubercular subject far advanced in the third stage of the disease, nor can any operative interference be of benefit to a cancer case with glands involved that it is impossible to remove. The positive diagnosis of phthisis should always be made early, and no cases be allowed to drift along until they get beyond the aid of any and every means of rescue. Then the percentage of cures would be much larger, and the lot of those members of the profession who battle with this dread monster would be more enviable than is now the case.

After this lengthy preface, the results given in this paper can be better appreciated. I claim no cures, for I have used the method less than a year.

I have followed the directions of Shurly and Gibbes quite closely, except in giving the inhalations of chlorine gas. In a hospital the gas can be evolved from chlorinated lime in a small chamber, but in private practice, with the majority of patients in hotels and boarding houses, such conveniences cannot be had. For the same reason the inhalations have been given but once a day, and then the chlorine gas was set free from the aqua chlori (United States Pharmacopœia), mixed liberally with a solution of chloride of sodium, and sprayed with considerable force (forty to seventy-five pounds' pressure in the receiver) into a small, closed air-chamber. A large bottle serves very well for the air-chamber. A hole is bored in the side, and an inhaler attached to the neck of the bottle. It is then suspended from the ceiling, so that the patient, seated in a chair, can apply his mouth to the inhaler, and the atomizer is used through the hole in the side. I saw this arrangement in Professor E. Fletcher Ingals's office in Chicago.

Originally I procured my solutions of iodine and gold from Professor J. E. Clark, Detroit College of Medicine. I have had no abscesses, and beyond the smart at the time of the injection and for half an hour afterwards, no

* Read before the Buncombe County Medical Society, November 2, 1891.

unpleasant symptoms. The indurations remaining after the injections of corrosive sublimate in syphilis are much larger, more painful and permanent, than those following iodine and gold injections.

I have not found that patients lose weight while taking this treatment, when at the same time every possible means is used to keep their nutrition at the highest point. One of the first results is to increase the amount of expectoration. It becomes more fluid, and the quantity gradually lessens, until finally râles have disappeared and small cavities have become dry.

Patients almost invariably sleep longer and more soundly when under the influence of the gold and iodine. Stubborn night-sweats, which have resisted the usual remedies, either cease without special treatment or become more amenable to it. I have not found it necessary to suspend the treatment if diarrhœa comes on. The diarrhœa is treated in the usual manner, with arsenite of copper, bismuth, etc., and the injections continued.

The injections are given for the first fortnight daily, beginning with the minimum dose, $\frac{1}{12}$ grain of iodine and $\frac{1}{80}$ grain of gold. The different solutions are used on alternate days, or, as recommended by Shurly, the iodine daily for a week and the gold daily for a week. During this time the dose is gradually increased, until the patient is given $\frac{1}{3}$ to $\frac{1}{2}$ grain of iodine and $\frac{1}{6}$ to $\frac{1}{4}$ grain of gold. I have given larger doses, but have then always found the patient saturated with iodine, tasting it in his expectoration, depressed and languid. The small dose, frequently repeated, with this, as with so many therapeutic agents, is more powerful against the disease and less hurtful to the patient. After giving a grain of iodine in one injection, I was called to see the patient in a few hours, and found the ary-epiglottic folds greatly swollen and œdematous. There were ulcerations in the larynx before, and the large dose of iodine seems to have irritated the tubercular deposit in some way. Under smaller doses this complication did not occur again, nor has it in any other case. No changes have ever been observed in the infiltrated portions of the lungs after the injections.

Just how these remedies act is an unanswered question. Chlorine, iodine, and the gold salts have all very great germicidal properties. Whether they act upon the bacilli or upon the toxalbuminoses produced by the disease it is difficult to say. I am convinced that in some way they exert a marked influence upon the course of the disease, as shown by the effect on the fever, the night-sweats, and the bronchial secretion, and by the increase in weight and improved sleep.

The inhalations of chlorine gas are always more or less irritating, and cause some coughing. They are well borne, except in ulcerative tubercular laryngitis. In the latter condition I substitute a spray of menthol and creasote. The ulcerations are also treated locally with menthol, creasote, lactic acid, etc.

Short accounts of a few cases will be added; the notes are taken from my case-book.

The first case is the first one I used the treatment on.

Case I.—Mr. B. J., 28 years of age; native of Ohio; family history of tuberculosis; came in December, 1890; had tuberculosis, following pneumonia and pleurisy; the lower lobe of the right lung was consolidated; jerky respiration and moist râles anteriorly above the consolidated portion; apex free, and respiratory murmur normal to third rib; left lung not affected; small tubercular ulcer situated in the inter-arytenoid space; tubercular bacilli found in sputum; expectoration very free; night-sweats; temperature went up to 101° or 103° F. every day; weight, one hundred and thirty pounds; had weighed one hundred and sixty-five pounds.

Under general tonic treatment, hypodermic injections of creasote and local treatment of larynx, he improved greatly. Temperature seldom reached 101° F., night-sweats ceased, and he weighed one hundred and forty-five pounds. In March he over-exerted himself, and had a relapse. Fever and night-sweats returned; right apex became involved. He lost weight and strength, until he was unable to leave his bed. At this period in his history he was put on the Shurly-Gibbes treatment without the inhalations of chlorine gas. He took fifteen injections. The dose was always small. He slept better and his night-sweats disappeared, and his fever was not so high. He became saturated with iodine, tasted it in his expectoration, and refused to take any more. He was taken home, and died there in a few months.

Case II.—Mr. B. R., aged 30 years; family history good; native of New York; first seen in February, 1891; tuberculosis of lungs and larynx dates from attack of la grippe six months previously; ulceration of right vocal

cord and interarytenoid space; larynx swollen and paretic; aphonic; apex of right lung consolidated to third rib; fine râles to centre of chest in front and mucous râles behind from spine of scapula to base of lung; prolonged expiration in left apex; evening temperature, 101° to 102° F.; night-sweats. Treated generally with tonics, baths, etc., and the larynx locally with lactic acid, menthol, and creosote. He improved in weight and his fever did not come on daily, but at irregular intervals; consolidation began in apex of left lung.

Early in April the injections of gold and iodine were begun and continued daily for six weeks. He slept better from the start, and the last month had no fever nor night-sweats. He gained in weight. The râles had disappeared from right lung, and no further infiltration took place. The ulcerations in the larynx healed entirely, but the voice, while stronger, was hoarse. He returned to his home, and I received a report of his continued improvement in August.

Case III.—Miss K. J., aged 30 years; native of Missouri; maternal aunt had consumption. The disease had lasted two years when she came in February, 1891, weighing ninety-seven pounds; average weight, one hundred and ten pounds; had weighed one hundred and twenty pounds; tuberculosis of lungs. On right side a cavity was forming below clavicle in the infiltrated portion. Mucous râles over the entire right lung, except in consolidated apex, which extended to fourth rib in front and to spine of scapula behind; left side roughened inspiration, and prolonged, audible expiration in apex; a few moist and sibilant râles in lower lobe behind; temperature, 102° to 104° F. every afternoon and night; profuse, weakening night-sweats; expectoration very free and quantity large; tubercular bacilli were found in great numbers in her sputum.

She was treated constitutionally in the usual manner until early in May, with but little change, when she was put on the Shurly-Gibbes treatment with inhalations of chlorine gas. This was continued for two months, in which time she received over forty injections and as many inhalations. Her fever gradually left her, and on examination, June 9, showed a small dry cavity below clavicle, right side; no râles anywhere; expectoration reduced to a small quantity on arising in the morning, night-sweats rarely occurring, and weight one hundred and one pounds. An attack of diarrhœa came on early in July, during which she lost several pounds. This was soon controlled, and she has steadily gained in strength since.

October 31.—An examination showed that the disease was quiescent; no fevers, no night-sweats, no cough, except early in the morning, which is probably due to pharyngeal mucus; weight, one hundred and six pounds; has taken no medicine for past three months. This was an advanced case. She did not improve until put on gold and iodine and chlorine inhalations, which looks as though the treatment had helped her. She is confident of it herself.

Case IV.—Mr. K. W., aged 25 years; native of New York; family history good; no fever, no night-sweats; expectoration small in quantity, but contained tubercle bacilli; hacking cough almost constant; voice hoarse; physical signs of a slight catarrh in both apices; vocal cords reddened but not ulcerated; weight, one hundred and seventeen pounds; average weight, one hundred and twenty pounds; treatment began in April.

General tonic treatment for one month; no gain in weight or change in condition; larynx somewhat improved under topical applications.

Was then treated one month on the Shurly-Gibbes method without inhalations of chlorine gas. At the end of that time he weighed one hundred and twenty-six pounds, which was more than he had ever weighed; had good appetite and digestion. There were no râles in either apex, but prolonged expiration remained. In the very sparse expectoration no tubercle bacilli could be found. His voice was stronger, and larynx presented normal appearance,

In order not to make this paper too long, no more histories will be given, but a simple synopsis of results, from which no case is excluded that has had as many as fifteen injections.

Total number of cases, twenty-two.

Advanced cases, with no improvement in their condition, to which category Case I. belongs, six, or twenty-seven per cent. of the whole number.

Advanced cases, with improvement, to which category Case II. belongs, eight, or thirty-six per cent. of the number treated.

Cases which have shown very great improvement, including advanced and incipient cases, to which category Cases III. and IV. belong, eight, or thirty-six per cent. of the total.

It is impossible to compare these results with those obtained without the injections,

in those cases in which reliance was placed entirely upon climatic and tonic treatment, with attention to symptoms as they arose, for two reasons.

The first is, that many cases come here so far advanced that euthanasia is the one object of all treatment. They cannot oftentimes even reach their homes alive. Such cases would throw the balance at once to the side of the Shurly-Gibbes treatment, and evidently unjustly.

The second reason is, that, in parallel cases the comparison could only be made with those who have refused the Shurly-Gibbes remedies,—patients who have not had the courage to undergo the treatment. The temperament of such cases is against them in their battle for health.

That the climatic conditions at Asheville are especially well suited to tubercular patients is very generally acknowledged, and I can report several cases that were here last year that have gone on since without relapse or any return of the symptoms of their disease.

The climatic, combined with the Shurly-Gibbes treatment, is the one I now urge on all cases, and I do so from the conviction that the latter is a decided aid to the former, and that a larger percentage of improved, and possibly cured, cases results from the combination than from climatic treatment with careful supervision alone.

No aid should be omitted that offers the least hope, and if cases are sent away from home early in the history of their disease, and with the best climatic surroundings are given the advantage of scientific care and direction, the prognosis is not as hopeless as it would have been considered only a decade ago.

DRUGS,—WHAT ARE THEY GOOD FOR?

By W. H. Washburn, M.D., Milwaukee, Wis.

DURING that long and remote period of time in which man, clothed in the raiment with which nature provided him, wandered alone on the face of the earth, not yet having invented articulate speech, he had no more knowledge of remedial agents and resources than is possessed by the chimpanzee.

When, in obedience to the law of evolution, language developed, society became organized, and the forces of nature were to a certain extent subdued to the uses of man, wealth began to accumulate, and *all* his time was not required to secure the absolute necessities of life, then there was leisure for meditation, speculation, and investigation.

Civilization having first appeared in tropical or semi-tropical latitudes, where the aspects of nature are, comparatively speaking, terrible, the imaginative faculties of the mind were early brought into exercise. Events occurring suddenly, without apparent cause, such as earthquakes, volcanic eruptions, inundations, epidemics of fatal disease, were attributed to the wrath of an outraged deity. Disease thus being thought to be of supernatural origin, it followed naturally that the first remedy that suggested itself to the mind of man was some sacrifice to appease the anger of the offended god. And, if a sacrifice were to be offered, the individuals who would be expected to officiate with the greatest prospect of success would be the priests devoted to the service of the gods. It thus happened that the sacerdotal class very generally, and over a wide extent of the earth's surface in both hemispheres, were the first to practise the healing art.

Magic and incantation were the earliest means resorted to to effect a cure. When, however, in the course of revolving ages, it was found by accident or experience that certain roots and herbs possessed remedial virtues, these were added to the armamentarium of the magician. But, owing to the unshaken confidence of the masses of the people in the efficacy of magic, there resulted a very interesting combination of the practical and magical in their methods. The practical recipe might contain any variety of roots and herbs, applied in ointment or drunk in decoction, but with this the magical formula was also required to deal with the demon cause of the disease.

That the magi—a name given by the Greeks to an hereditary line of ancient Persian priests—exercised a considerable influence upon the subsequent civilization of the Western world is attested by the fact that they gave their name to sorcery, enchantment, necromancy, and the so-called occult sciences in general. The word magic is still used with the same signification as it was in ancient times,—that is, to indicate "a confused mass of beliefs and practices, hardly agreeing in anything except in being beyond those ordinary actions of cause and effect which men have come to regard as merely natural." Belief in magic is regarded as among the earliest evidences of the growth of human thought. That this is true is shown by the fact that it appears in the

records of the most remote antiquity, and exists in a marked degree among those members of the human family, now existing, who are lowest in the scale of civilization, as, for example, some of the native tribes of Australia, whose whole existence is oppressed by the terrors of sorcery. Every published work on the present condition, customs, habits, and beliefs of savage tribes indicates the powerful influence enjoyed by the native magician, who not infrequently represents in his single person sorcerer, priest, medicine-man, and even chief of his tribe.

Among the cultured and civilized nations of the ancient world magic held a prominent place. Their literatures are largely responsible for forming magic into more or less elaborate ritualistic systems. The literary remains of ancient Egypt, Babylon, and Assyria illustrate this, Egypt and Babylon especially being the chief source from whence the later world learned what has been referred to as the higher branches of occult science. Later, through the literatures of Greece and Rome, magical rites, mysteries, and ceremonies were introduced into the Western world. Greek mythological literature is alive with the magic; the consultation of oracle gods at various temples, of which that of Apollo at Delphi was the favorite; the turning of the companions of Odysseus into swine by Circe; the twelve labors of Hercules; the story of Orpheus and Eurydice, etc.

The rise of Greek philosophy several centuries before Christ threatened the overthrow of magic and magical systems, but Greek philosophy being the outgrowth of *deductive* methods of reasoning, soon evolved numerous *schools*,—the Ionian, Eleatic, Cynic, Pythagorean, Epicurean, Sophistic. The speculations of the exponents of these different schools soon became more or less mystical, and there was theorizing on the significance of numbers, harmonical relations, the harmony of the spheres, transmigration of souls, the interpretation of dreams, the nature of the world and the soul, etc. And hence Greek philosophy only served, perhaps, to change somewhat magical speculations.

Among the early Christians sorcery was recognized as illegal magic and as such was condemned, when Constantine made Christianity the legal religion of the Roman empire, Thor and Odin were declared to be demons and the rites of their devotees proscribed. During the middle ages magic was represented in Europe by mysticism and scholasticism, a species of theological philosophizing, and by witchcraft, only dismissed from belief in modern times.

During all this long period medical philosophy was largely a mass of absurdity. Hippocrates, the father of medical philosophy, was contemporary with Antisthenes, Aristophanes, Democritus, Diogenes, Isocrates, Plato, Protagoras, Socrates, all of whom were deductive reasoners, and his medical speculations were deductive. As Greek philosophy soon broke up into numerous schools, in consequence of the imperfections of the deductive method, so medical philosophy, and from the same cause, developed many schools,—the empirics, the dogmatists, the methodists, the eclectics, the humoral pathologists, the solidists, the animists, the iatro-physicals, the iatro-chemicals, the Brunonians, the sceptics, the homœopathists. These schools attempted to evolve from the inner consciousness a knowledge of the nature of disease and the means of cure, and, reflecting the influences of the times, were more or less fanciful, mysterious, magical. Disease was an entity existing in the blood, and hence phlebotomy, the body being composed of all the parts of visible nature, the "sun, moon, stars, and the poles of heaven," and subject to the same chemical laws, disease was to be treated by chemicals. Disease was a "spiritual dynamic derangement of our spiritual vital principle," and to be treated by drugs spiritualized by attenuation, and acting by virtue of "some occult, self-existing force," etc.

In our times, and among the educated, nothing is now heard of belief in necromancy and magic, and the THING itself alone remains. Communications in "spirit circles," spirit-writing, the fear of spilling salt, the stranger in the tea-cup, the shroud in the candle, the divine intervention in the production of disease, floods, and other calamities as a punishment for blasphemy, Sabbath-breaking, or other wrong-doing, the cure of inflammation by a "thunder-bolt," a potato in the pocket for the cure of rheumatism, the galvanic belt, the faith-cure, blue-glass, Christian science, etc.

It will thus be seen that the human mind for the past five thousand years has been *drilled* into a belief, in one way or another, in the mysterious, the supernatural, the magical. The influence of all the traditions and literatures of the past has oppressed us, and given us a mental character predisposed to grasp at the unknown, to believe in the unseen. An exaggerated respect for the past

has retarded the progress of civilization on every hand, and in no line of thought more than in medical philosophy.

The brief historical view here given shows, I think, the genesis of the feeling entertained by the majority of mankind, and even of educated mankind, that there may still be an effect without an adequate and natural cause, and that disease is in some way *mysteriously cured* by drugs. And I am persuaded that there are many, even in the ranks of the medical profession, who have not yet succeeded in overcoming a mental predisposition which has been handed down to them by an ancestry more than five thousand years old. We see this illustrated in the doctor who prescribes the new drugs as soon as they are foisted upon the market. Being new and unknown, there is something fascinating about them, and they are prescribed in the hope that in some occult, mysterious, magical way a cure may result. I imagine that this brotherhood must be numerous in the profession from the great number of travelling men who call upon me with samples of new remedies or new compounds of "wonderful power."

Dr. John W. Draper has well said, "In the confidence of youth he (man) imagines that very much is under his control; in the disappointment of old age, very little. As time wears on, and the delusions of early imagination vanish away, he learns to correct his sanguine views, and prescribes a narrower boundary for the things he expects to obtain. The realities of life undeceive him at last, and there steals over the evening of his days an unwelcome conviction of the vanity of human hopes." Of no class is this more true than of medical men. As the graduate goes forth from the portals of his *alma mater*, feeling, as many do, that his education is finished, he believes that disease and death will retreat before his *attacks* and skulk ignominiously from the field; that he possesses in the materia medica weapons from whose use he will witness "marvellous results." But as time wears on the "realities of life undeceive him at last," and he is apt to fall into a routine and hap-hazard way of prescribing drugs without any expectation of achieving results. Having himself risen above the mental horizon of the laity, he despises their belief in the efficacy of drugs, as the magician of old despised those whom he duped. He believes that nature alone and unaided effects a cure, and that drugs are useless; but the practice of medicine being a "business," as well as an art, he continues the methods of his prototype, the magician. He knows that his patient believes disease is an entity to be driven from the body in some mysterious way by the agency of drugs, and hence, while he gives practical directions as to diet and regimen, he at the same time prescribes some drug to please the fancy of the patient; or, in other words, incant—that is, enchant—the demon cause of the disease. He has studied the experiments of Louis and his colaborers on the natural history of disease, and, imbued with the belief that nature is competent to effect a cure in any case where cure is possible, thinks that "it would be better for mankind if all the medicines were poured into the sea, but it would be hard on the fishes," and that "physicians have hurried thousands to their graves who would have recovered if left to nature." He hence becomes a medical nihilist. His conclusions are largely due to the fact that he prescribes drugs as a matter of form or "business," and does not expect, and, in fact, does not observe, results, and he thus gradually brings himself to believe that they are of no use whatever.

The craze of the day being external medicine,—surgery,—he is apt to go into that field enthusiastically, and often more or less blindly. Entertaining, as he does, the most profound admiration for the achievements of modern surgery, he regards, with a feeling akin to pity, the mere physician, and concludes that the only real service rendered to mankind by the profession is by means of surgical procedures.

It seems to me that he who arrives at this conclusion has not succeeded in elevating his mental vision much, if any, above that of the "common herd," and has fallen far short of that intellectual altitude from which he can take a general view.

He has forgotten the discovery of Schönlein, in 1839, that the contagious disease of the scalp, known as favus, is caused by a microscopic parasite, the *Achorion Schönleinii*, which discovery has led to positive and curative treatment by means of drugs of a long line of skin-diseases. He has forgotten the specific effects of mercury in syphilis, quinine in malaria, iron in chlorosis, atropine in certain affections of the eye and in opium-poisoning, and digitalis upon cardiac action.

A great step in advance will be taken when physicians pay more attention to the study of the physiological effects of drugs, and learn to recognize the fact that "the advance of medical science consists not so much in the discovery of new drugs as in a better understanding of how to use old ones."

I shall only take time to call attention to a few individual drugs as illustrations of what can be done in the way of alleviating pain and in the postponement of death by their use. But, before entering upon this part of the subject, I want to emphasize the fact that in very few, if any, cases does the physician *cure* disease. The office of the physician may be compared with that of the pilot of a boat in its descent through the rapids of the St. Lawrence. The business of the pilot is to guide the boat safely past the rocks and shoals. He does not propel the boat, neither can he arrest its onward flight. So with the physician. He cannot "break up" the disease, nor can he effect a cure. The power which heals the sick is the *vis medicatrix naturæ*, and the physician is the pilot who attempts to so manage the individual case as to avoid the rocks and shoals, or, in other words, he aids nature by removing obstacles from her way, or by supplying materials with which she can work. This is all that can be accomplished in the present state of our knowledge, either by the use of drugs or surgical procedures. If, then, this fact is kept well in mind, we shall "prescribe a narrower boundary for the things we expect to attain," and we shall suffer fewer disappointments, and more often attain the things we expect and hope for, while we shall less frequently fall into sins of commission.

In the practice of medicine, pain is one of the most frequent conditions we are called upon to relieve. Opium, therefore, by virtue of its analgesic properties, the Hercules of the materia medica,—a drug without which the practice of medicine would be a delusion and a snare,—demands the first word. This drug exerts a primary action upon the brain and spinal cord, by which nervous sensibility, both motor and sensory, is diminished, and hence relaxation of contractile tissues and lessened sensibility to external impressions. These effects of the drug are well illustrated in renal and bilious colic, in which affections its action upon contractile tissues results in relaxation of the muscular walls of the ducts, and its action upon sensory nerve-fibres ameliorates pain. In renal asthma—a condition caused by constriction of the pulmonary arterioles—the same merciful effects of the drug are witnessed. In inflammatory processes, accompanied by pain, as a result of increased textural change in the nerve itself, opium not only relieves pain, but, by lessening the amount of textural change in the nerves, produces a curative effect,—that is, it assists the human organism to initiate that internal reaction to external action, by which nature effects a cure, while at the same time it renders the patient's suffering less acute, and the majority of mankind will agree with the late Professor Allen, of Chicago, in saying, "As for me, give me freedom (from pain) or give me death." In such cases, in so far as the opiate controls pain, in just so far does it control textural change, and thus aid nature in effecting a cure.

In physostigmine we have a motor depressant which acts powerfully upon the respiratory and circulatory centres, and also upon the spinal motor centres, thus rendering it a valuable agent in certain forms of maniacal excitement occurring in patients suffering from general paralysis. It is believed that, by virtue of this action, the drug retards the progress of the disease, and, in some instances, has arrested it for a time entirely. Its constitutional effects are antagonistic to those of strychnine, and hence its value in strychnine-poisoning. Its active principle, eserine, is, I believe, extensively used by oculists to produce its specific effects upon the eye,—namely, contracting the pupil and lessening intraocular tension. Another drug used successfully by oculists is cocaine, which not only renders great service as a local anæsthetic, but also, by its action in contracting the arterioles, produces curative effects upon inflammatory processes.

Aconite is a drug which lowers the action of the heart and respiration and dilates the cutaneous vessels, thus increasing thermolysis and relieving local congestions. I believe I have seen cases of quinsy absorbed by the early use of the drug, which is specially useful in acute catarrhs of the upper air-passages.

The beneficial effects of alcohol as a general stimulant in adynamic conditions, such as we often see in typhoid fever and pneumonia, need only be mentioned. By its use the vitality of the patient is so reinforced as to bridge over the critical period.

Nux vomica is another drug whose uses are such as to entitle it to a place in this paper. Experiments have established its right to be classed as a cardiac and respiratory stimulant, and, since the publication of Fothergill's "Antagonism of Therapeutic Agents," it has been widely used to secure these ends. By virtue of these properties, it antagonizes the toxic effects of aconite and chloral. Its effects are often striking in the dyspnœa of broncho-pneumonia, and also in the distressing dyspnœa of bronchitis occur-

ring in patients suffering from chronic pulmonary congestion, the result of heart-disease. Nux vomica, by its stimulant action upon the sympathetic nervous system, aids digestion, and increases the activity of the various glandular organs of the body, and, probably, by thus hastening the elimination of ptomaïnes, relieves "sick headaches" depending upon torpidity of the digestive and excretory organs. As to its value in such headaches there is much evidence, and, I am happy to say, that I am able to bear personal testimony to the fact that for six years it has acted with unvarying success. I have found strychnine of value as a heart stimulant in the later stages of chronic interstitial nephritis where cardiac failure is present, Since the publication of Fothergill's experiments, which demonstrated the fact that strychnine is a cardiac stimulant, it has been used to a considerable extent in the later stages of typhoid fever and pneumonia, when such an agent is indicated, and recent reports of cases in the journals have corroborated the conclusions reached by Fothergill.

It has been my practice through life to look with suspicion upon the new drugs which chemistry and pharmacy, especially of late, are rapidly introducing to us. When it is remembered that the few drugs we now possess, which occupy a settled, or nearly settled, position in therapeutics, have been known and in use, in some cases, for centuries, it will be seen that a few months or years are not enough to establish the reputation of a new agent so firmly as to justify the practitioner in submitting his patients to their experimental use. But as the new antipyretic group has now been before the profession for some years, I shall be excused if I advert to it. In speaking of this group, I shall refer to phenacetin as typical of its virtues.

While it may not, and, so far as I know, does not, exert any curative influence over pathological processes, it certainly often adds very much to the comfort of the patient while nature is effecting a cure. By its stimulation of the inhibitory centres of the brain, it is capable of relieving many aches and pains, as was conspicuously shown during our recent epidemic of influenza, not to mention its well-known effects in certain painful neuroses.

While I am not very much given to the use of antipyretics in cases of fever, I believe there are occasions when their use is not only proper but urgently demanded. In rheumatic fever we have a disease in which there is the greatest activity in nitrogenous waste, and hence the amount of heat production is greater than in any other febrile disease. It does not necessarily follow, however, that the body temperature is excessive, for the thermolytic action of the cutaneous surface is stimulated to the highest degree, profuse perspiration occurring, as it rarely, if ever, does in any other disease, and there is, consequently, excessive heat loss. But when any function is carried to its highest activity, it is on the verge of failure, and so here the thermolytic action of the skin may suddenly cease, and then there supervenes that condition known as hyperpyrexia. In such an event as this, a drug, like phenacetin, which reduces body temperature by diminishing nitrogenous catabolism, and hence thermogenesis, may be expected to serve a useful purpose, and I believe will often save life. I am certain that I have seen immediate death averted, in at least two instances, by a rapid reduction of body temperature by means of this drug.

It would be easy to indefinitely prolong this list of illustrations, but sufficient has already been said to point the moral which it is the purpose of this paper to inculcate,—namely, let the scientific physician prescribe *drugs* only when he has some good reason therefor, and then prescribe with a direct view to obtaining physiological effects. Do not prescribe a new drug because some one else has used it in a certain case, and the patient survived. Remember that in comparatively few cases are the efforts of the physician directed to curative treatment. He must recognize the fact that disease is not an entity in the body to be driven out in some mysterious way by the agency of drugs, but that it is "a perversion of the material structure of the body or some of its parts," the result of "some unusual external action, to which there has been no answering internal action;" that his office is not specially to *combat disease*, but to so conserve the vitality of his patient that nature may have an opportunity to initiate the necessary "answering internal action" by which health is restored; that in the discharge of his duties as physician, he is simply the gentlemanly "hod-carrier of nature," supplying, it may be, materials with which she can work or removing obstacles from her way.

N.B.—Some portions of this paper are taken from an essay by the present writer, which appeared in the *Medical and Surgical Reporter*, July 11, 1891.

803 Grand Avenue.

*A CASE OF OVERDOSE OF CANNABIS INDICA.**

By W. D. Hamaker, M.D., Meadville, Pa.

I WAS called suddenly one evening in July to see Dr. D., a recent graduate in medicine, who had taken at 5.20 P.M., by way of testing the quality of the medicine, 41 drops of Squibb's fluid extract of cannabis indica, dropped from the bottle with the cork. I saw him at 7.15 P.M., and with his permission I will give a brief account of his symptoms, based on notes taken at the time.

7.15 P.M.—When I entered his house I found him walking the floor excitedly, laughing and talking continuously, but not incoherently. At times he would cry, and then suddenly change to laughing. He explained to me at once what had happened, and said there was no use sending for me, as the symptoms would wear off in an hour or two, and that he would have to bear it till the effects wore off. He kept on walking rapidly, and talking in a tone of voice pitched higher than his usual tone, and could not sit or lie down for a minute. If we would induce him to lie down, he would get up immediately and begin his rapid walk.

7.30 P.M.—Pulse, 120; respiration, standing, 48; temperature, normal. He scolded occasionally when there was nothing scarcely to warrant it, and was easily irritated by anything his younger brother said or did. Time seemed very, very long. This was his constant complaint. He said he felt as if he were "rattling around among the centuries." When I put the thermometer under his tongue he took it out in a few seconds, because it took so long a time he could not keep it there. He then resumed his walk.

7.40 P.M.—Talking foolishly, and reproaching himself for being rash. He complained of a "leathery" feeling in the calves of his legs and "a strange feeling in the bowels."

7.41 P.M.—Said the feeling was extending up the legs, but could not describe it. Sensation seemed natural if I touched the leg. He had no idea of time. A minute seemed like hours, but he could reason out that he was at fault by the aid of the two facts,—that he had taken the hemp at 5.20 P.M., and that it was still daylight and that the lights had not yet been lit. When he tried to think "everything goes," "everything gets slippery when I try to get hold of anything." Foolish remarks at times.

7.45 P.M.—Sat down, and kept more quiet for a while; stood at the window for a few minutes; sat down again; reproached himself for giving trouble.

7.48 P.M.—Laid down; kept feet moving for some time; jerking of the tendons was marked all along. There was difficulty in catching the words he wanted when he tried to say anything, and in attempting to get the word needed he would often lose the whole idea he had started out to express. About this time he gave me a lecture on Dr. Hart's "den of bones," attempting to bring in the word osteo-syndesmological frequently, but stumbling on the pronunciation every time he attempted it. In a few minutes more he lay very quiet, and thought he would probably sleep. I left him, and returned about 9 P.M., when I found that he was quite well, but somewhat languid and drowsy. Afterwards, in conversation, he gave me the following additional impression: Just after the first symptoms came on him, he recollected what he had taken, and a feeling of dread of danger came over him. This lasted a very short time, and never returned. He dreaded a possible symptom that he had read in H. C. Wood's experience,—that of falling. The peculiarity about his mental operations was that while thinking on one subject other thoughts would dart in to interfere with the first, and in talking his sentences and expressions would be of a mixed character, as derived from different lines of thought or subjects. I omitted to state that there was redness of the eyes and profuse lachrymation, even after other symptoms had disappeared. Pulse remained rather quick while under my observation, but I was not able to count it very often on account of his restlessness. Respirations did not remain as rapid as at first. No treatment of any kind was used.

883 Water Street.

* Read before the Crawford County Medical Society, August 5, 1891.

*LA GRIPPE.**

By Walter P. Ellis, M.D., Livermore, Ky.

I PROPOSE to devote what I shall have to say to-day to the consideration of a disease which, until quite a recent date, was practically unknown to the profession in this country, at least in its present form, and yet, at some time during the last two years, it has been epidemic in almost every civilized coun-

* Read before the McLean County, Ky., Medical Society, at its regular meeting, August 1, 1891.

try of the globe. I refer to what is now almost universally known among the laity as *la grippe*.

This name was given to the disease by the French because of its rapid onset and the suddenness with which it assumed epidemic proportions. For the same reasons, and because no time was allowed scientists to assign to it its proper nosological position, each country or people had its own peculiar name.

Next to *la grippe* the most common appellation is the "Russian influenza," from the fact that it had its origin in the Russian capital. A noted English physician has called it a "bastard pulmonary rheumatism," which, perhaps, comes about as near its true character as any name that has been suggested. The multiplicity of names indicates that the nature of this disorder is by no means perfectly understood, and until it is we know of no better name than "*la grippe*," because it implies kinship with no other malady, and commits us to no theory as to its nature or origin. As to the etiology of la grippe there is little doubt of its microbic nature, although the specific micro-organism has not yet been isolated and its causal relation to the disease demonstrated. Many bacteriologists have investigated the subject, and more than once it has been announced that the labors of some one had been crowned with success, but up to the present time it must be admitted that the agile microbe—bacillus, coccus, or whatever it may be—has eluded the highest magnifying power of the microscopist.

Dr. H. B. Baker, of the Michigan State Board of Health, has devoted considerable time to the discovery of the cause of influenza. He says the germs of the disease are always present, but that certain meteorological conditions are necessary to irritate the air-passages sufficiently to enable the germs to gain an entrance into the body; these conditions being an excessive amount of ozone in the atmosphere and an unusual prevalence of north and northeast winds.

La grippe is certainly no respecter of persons, for while the weak and delicate, and those at the extremes of life, suffer more seriously from its ravages, the strong and robust are not exempt; all ages and conditions are alike attacked by it.

Whether or not it is contagious has never been definitely settled, many contending that it is not, depending altogether upon atmospheric or telluric conditions for its propagation and continuance; while others claim that it is at least feebly so, and cite many facts which can be explained on no other hypothesis. My own experience leads me to believe that, if contagious at all, it is so to such a slight degree as to be practically ignored.

During the noted epidemic of 1889–90 I was almost continually exposed to the influence of the disease, and yet neither I nor any of my family were attacked by it, my house and one other being the only ones in the town of six hundred or seven hundred inhabitants that were exempt from the malady. This, too, without any especial effort at prophylaxis. On the other hand, a case is reported of a traveller who had the disease while in London, and, immediately upon his convalescence, went to Paris, where he was taken speedily worse and died. His remains were embalmed and sent to his home in this country, where the disease was not then prevalent. Upon its arrival, the coffin was opened, and the body viewed by friends and relatives. Although there was no other source of contagion, many of those who saw the body were soon after taken sick with la grippe, and altogether there were eighteen well-developed cases. This case, if it means anything at all more than a mere coincidence, is a rather strong argument in favor of contagion.

The general observation also has been that in the recent epidemics the course of the disease was not in accordance with that of prevailing winds, but rather along the great lines of travel, which seems in favor of the theory of its dependence, in some degree, at least, upon personal contact of individuals for its propagation.

The symptoms of the disease are many and varied, as would be supposed from the variety of names that have been bestowed upon it. In some cases its onset is sudden, and it may go as quickly as it came, while in others it is preceded by a period of malaise extending over several days, or even weeks, with a tendency to frequent relapses. Usually it is not slow in asserting itself after the victim has been exposed to its influence.

There is a short period of dulness and malaise, and then usually a chill, followed by fever of a more or less pronounced type, with pains in the joints and bones, and a general muscular soreness, as if the patient had just undergone the most violent exercise, or, as some express it, "as if they had been beaten all over with a club." This resemblance to dengue, or muscular rheumatism, was characteristic of nearly all the cases that came under my observation. The rise of temperature is persistent, but the chart is very

irregular, showing many sudden curves, yet differing from that of intermittent fever in the absence of regularity in the rise and fall. The temperature ranges from 100° to 103° F., very seldom going above the latter point in the absence of complications. The pulse in the beginning is full and strong in sthenic cases, but it soon loses these qualities, and, with the defervescence of the fever, becomes weak and thready.

There is generally an increase in the quantity of urates, while the amount of urine passed in twenty-four hours is less than normal, with sometimes a trace of albumen. This, however, is by no means constant, and must be regarded as an exceptional complication.

In the majority of cases the disease begins in the mucous membranes of the nasal and respiratory passages, resembling very much the premonitory symptoms of a "cold in the head," which, however, rapidly assumes more formidable proportions, accompanied by some sneezing and paroxysms of cough, which at this time is usually out of all proportion to the physical signs.

As the case progresses, bronchitis, bronchopneumonia, and pneumonia proper may develop, when the physical signs of those diseases show themselves. Upon the nervous system the disease has a peculiar depressing influence, characterized by sleeplessness, dizziness, or a tendency to fainting, with a condition of mental hebetude which indicates the profound impression made upon the nervous centres, and which lasts during the whole course of the disease, until convalescence is established. The complications which may arise during a case of la grippe are numerous, and many of them are of so serious a nature as to determine a fatal issue. Especially is this true of those diseases affecting the respiratory organs. It is a very general observation that bronchitis, pneumonia, etc., complicating or following influenza, are attended by a much greater rate of mortality than is usual under the ordinary conditions. The Vienna correspondent of the *British Medical Journal* states that during the epidemic of 1890 in that city aural complications were very common. Acute inflammation of the tympanum, with hemorrhage, and catarrh of the Eustachian tube and tympanic cavity were most commonly met with, but even bilateral *purulent otitis media* was not unusual. He also states that cutaneous complications of an acute character are prone to recur.

Various forms of herpes, erythema, eczema, and even measles are mentioned. I have myself frequently observed these cutaneous affections occurring as complications in cases of influenza, but the most common in my experience has been urticaria, with some cases of eczema of the face and scalp, and one case of facial erysipelas.

It has been noticed and commented upon by physicians and health officers that the general tone of vitality is markedly lowered during an epidemic of influenza, and many are thereby rendered much more susceptible to the development of the graver complications. Another significant fact, which, doubtless, has its cause in this lowered vitality, is that all the most dangerous diseases increase in severity and fatality during the prevalence of la grippe. In view of these facts, it becomes the duty of the profession everywhere to do all in its power to prevent the recurrence of epidemics by impressing the laity with the importance of hygienic and sanitary precautions.

The subject of the proper treatment of la grippe is one upon which much has been said and written, but it is not my purpose now to do more than briefly sketch the methods that have been most successful in my hands. In uncomplicated cases I have found that active treatment is not always necessary. Many times I have ordered a full dose of quinine and Dover's powder at bedtime, a gargle containing tr. iron and pot. chlorate, followed the next day with a few doses of antikamnia or phenacetin, if there were any fever or rheumatic pains, with the result of cutting short the disease and preventing an attack. But cases that are so easily managed are the exception, not the rule; but the fact that there are such should not be lost sight of.

Quinine is almost always indicated, on account of the intermittent type of the fever, and given in full doses—12 to 15 grains—in the morning, the evening exacerbations are usually not so pronounced, and the course of the disease is favorably modified thereby. Quinine is also indicated for its tonic effect, by the extreme nervous depression and prostration which is an almost invariable accompaniment of the disease, and given in small doses,—1 to 2 grains,—at proper intervals, it meets and fulfils this indication admirably. Especially when used in combination with other remedies, as in the following prescription, it accomplishes results not easily obtainable with any other drug or combination:

℞ Quiniæ sulph.,
Salol, āā gr. iii;
Phenacetin, gr. iv.
M. ft. pil. vel cap. No. i.
Sig.—One or two every three hours.

The *Medical Age* is authority for the statement that Professor E. R. Palmer, of Louisville, considers this combination a specific, and, in my experience with it, it has never disappointed me. The professor recommends the salicylate of quinine instead of the sulphate in this prescription, but as that was not obtainable without some difficulty, the sulphate was used, with as good results as could reasonably have been hoped for. For the neuralgic or rheumatoid symptoms the best results are obtained from antikamnia, acetanilide, or phenacetin, especially if combined with salol.

Dr. C. L. Hogeboom, in the *Medical Record*, claims to have derived great benefit from the administration of full doses of oil of peppermint three times a day. He says that it acts with great promptness as a powerful stimulant to the vaso-motor nervous system, reduces the pulse-rate, relieves local congestion, and speedily dispels the most alarming symptoms. The oil is known to be a powerful germicide, and upon the theory of the germ origin of the disease, aside from its power as a diffusible stimulant, it is worthy of a trial.

When, as is often the case, the bronchial symptoms are severe from the start, an effort should be made to loosen the secretions by the administration of the wine of ipecac, in combination with ammonium chloride or spts. Mindererus.

My treatment of an uncomplicated case would be about as follows:

A mild cathartic, preferably a mercurial, would be given in the beginning of the case to remove any irritating substances, whether undigested particles of food, microbes, or ptomaïnes, from the digestive tract, and thus prevent their absorption to increase or complicate the existing troubles. This should be followed by a grain of opium, or ⅙ grain of morphine, to arrest cough, sneezing, or pain, and the mucoid secretion of the upper respiratory tract. This may be repeated as often as necessary, or, after the first dose, phenacetin or acetanilide may be combined with the morphine, if the nervous symptoms are pronounced and pain is severe. The pill of quinine, salol, and phenacetin is given every three or four hours, and the nares may be frequently flushed with some mild germicide solution, such as boric acid, listerine, campho-phenique, or whatever best suits the attendant's fancy.

In lieu of a hot bath, some diffusible stimulant should be given to prevent internal congestions and increase the peripheral circulation. Keep the patient in an equable temperature, free from draughts, and give good, wholesome, nourishing food, tonics, etc., with small quantities of an alcoholic stimulant if there is a tendency to asthenia. This, we believe, will be sufficient to insure a favorable termination in an uncomplicated case of la grippe.

FURTHER CONTRIBUTION TO THE THERAPEUTICS OF HAY-FEVER.

By Alexander Rixa, M.D., New York.

IN my previous contributions to the "Therapeutics of Hay-Fever," particularly in my last year's report (January number, 1891), I endeavored to show by what method I succeed in preventing the development of hay-fever, but also declared that I have been powerless to arrest the hay or reflex asthma, the most distressing complication of this painful disease. However, this year, I believe, I found a very efficient preparation, which controls the disease in a very surprising measure.

The remedy I have reference to is the *terpin hydrate*. It comes in the market in the form of colorless monoclinic crystals, which melt at 100° C., and has the composition $C_{10}H_{26} + 3H_2O$.

In my previous and my present investigations I attained the following results from its action: In small doses (from 2 to 5 grains) it liquefies and increases the secretion of the bronchial mucous membrane, and thus facilitates expectoration. In large quantities, however (in 15- to 20-grain doses), it reduces the secretion and renders expectoration less, until it stops it altogether. In cases of bronchial dyspnœa, in consequence of the plugging of the bronchi by too copious secretion, it is of the greatest value. In hay and bronchial asthma it acts like a charm,—*i.e.*, by giving it to those who are subject to the disease, it arrests the outbreak.

I administered it in capsules (5 grains each), in daily doses of from 45 to 60 grains, and more if required, without any disagreeable consequences. The best time for its administration seems to be during meal-time, about 15 grains being given at one dose, three times a day, and, if required, 15

grains at bedtime; and exceptionally, if asthma symptoms appear on damp, cloudy days, 15 grains more during the night. The results I obtained with this treatment were highly surprising and gratifying.

I treated ten cases of hay-fever this season, of which six have been subject to hay-asthma for a number of years. In but one case—a travelling salesman, who was attacked on the road, in a southern country—have I seen the hay-fever developed this year. However, as soon as the patient came under my observation, I put him under the following treatment: The nares were irrigated with nasal douche every three or four hours with one-third of peroxide of hydrogen and two-thirds of boiled water, cooled. The second day already the aggravating inflammatory symptoms disappeared, and then a spray of peroxide of hydrogen, with glycerin, c. p., half and half, in atomizer, was used during the whole period.

All the other cases were treated in the same manner as given in my last year's report, with the same satisfactory result.

In those of my patients subject to hay-asthma I also attained the most astonishing results with the terpin hydrate treatment. Four out of six cases did not have the slightest attack of hay-asthma during the whole season, and the other two had but two or three light attacks, which, however, were caused by carelessness and neglect in carrying out my orders. One patient went out during a cool evening and caught cold, while the other neglected to take the advised medicine as ordered, on account of his feeling well, believing that it was unnecessary.

In the first case a plugging of the bronchi took place, which caused a severe attack of bronchial dyspnœa. There, again, the *Javanese ipecacuanha*, a new preparation, acted promptly and like a charm. Half a teaspoonful of the preparation was given in some warm water, and in less than ten minutes copious expectoration and vomiting took place, relieving the patient instantly.

In all the cases where the remedy did not act promptly for a while, it was always due to neglect and carelessness.

In the last period of the disease—in the catarrhal stage—the *anodyne pine expectorant* rendered efficient service. The preparation is composed of a number of extracts, which act in the best meaning of the title as a true *anodyne*, and yet has the advantage of being very palatable.

Considering the great number of hay-fever sufferers in this country, I think my successful treatment of the disease will be a real boon to the afflicted. I would cheerfully request the profession to give this method of treatment a fair trial, and report the result.

1268 Lexington Avenue.

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*ON THE HYGIENE OF ASCARIS INFECTION.**

By J. Dewitz, M.D., Berlin, Germany.

THE extraordinary progress which bacteriology has made within the last decade has almost succeeded in eclipsing, if not totally obliterating, many a collateral science; for instance, helminthology. Fortunately, the latter entertains such vital relations to numerous questions of hygiene and health that it will ever sustain its important character. Quite recently significant discoveries have been made in this science which must engage the attention of all practitioners of medicine. Thus Braun has succeeded in determining in which animal the juvenile form of bothriocephalus latus lives; Grassi pointed out a tapeworm (*Tænia murina*) which, both in its immature and mature form, infests the intestines of one and the same animal; Leuckart and Thomas have elucidated the biological relations of *Distomum hepaticum*, the well-known foe of sheep. Of greatest interest, however, is the discovery of the development of the common round-worm (*Ascaris lumbricoides*). Formerly it was believed that the ascaris infection was a direct one,—*i.e.*, that the eggs of the parasite were transferred from man to man without intervention of an intermediate host. Even authorities like Davaine and Kuechenmeister advocated this supposition, which received an additional substantiation by the knowledge of the development of a related ascaris,—viz., of *Ascaris mystax*. This species occurs in the intestines of the cat, is identical with *Ascaris marginata*, which is found in the dog, and, as Leuckart has proven, develops without intermediate host. Still, in spite of all factors urging the belief in a direct transmission, the experiment gave always negative results. For that reason Leuckart,† in his well-known text-book on parasites, was induced to regard the existence of an intermediate host as necessary.

* Translated by J. Schmidt, M.D., Berlin, Germany.

† "Die Menschlichen Parasiten," vol. ii., 1876.

Linstow* pointed to small myriapodes (*Julus guttulatus* and *Polydesmus complanatus*) as possible intermediate hosts. Fortunately, Grassi, of Italy, and Lutz, a German physician of Brazil, were able to experimentally prove the *direct transmission of ascaris*. Grassi employed as object of experiment a boy aged 7, who, by proper anthelmintic medication, had been freed from all intestinal parasites, and in whose fæces no eggs could be ascertained by microscopic examination. The boy received in the last week of September a pill containing numerous ascaris eggs, which had already reached the embryonic stage. Twenty days later no eggs could yet be detected in the fæces. When, after an interruption of the examination, up to the close of November, the fæces were then re-examined, they were found to be teeming with ascaris eggs. The same boy took later a pill containing more than one hundred and fifty eggs (in their embryonic stage), and discharged one hundred and forty-three round-worms. During the course of the experiment every chance of infection was precluded. The proceeding instituted by Lutz is of considerable interest. The experimenter placed eggs in the state of development in a little bag of parchment paper, and gave the whole to a dog. When, after two days, the little bag was discharged with the fæces, all the eggs had remained together and were open to examination. It was found that a few embryos had escaped from the eggs. A second experiment was made on an adult, healthy man. This time the parchment bag had remained twelve hours in the intestines, and on being inspected showed numerous free embryos. The embryos were particularly numerous when the duration of the experiment was twenty hours. Another person, aged 32, ingested within twenty-three days six different doses of eggs. Six days after the last dose the person discharged a number of round-worms, measuring from five and a half to thirteen millimetres. The parasites were sent to Leuckart, and recognized as young human round-worms.

The reason of the failure of all previous experiments was also soon determined. In order to attain maturity in the human intestines, the eggs must previously reach a certain stage of development in a proper medium, such as damp earth or fæcal matter. Various helminthologists, such as Schubart, Richter, Davaine, and Leuckart, had a long time ago succeeded in producing the development of the eggs in water, whereby, however, the gelatinous enclosure of the egg-shell proper was destroyed. This protective enclosure is a necessary condition for the development of the egg. For, as Lutz believes, in the absence of this enclosure, the gastric juice is able to penetrate the shell and to kill the young worm, or the gastric juice may be enabled to dissolve the shell and to liberate the worm in the stomach, whereupon its destruction by the gastric juice would be inevitable.

The above experiments have thus proven that the human round-worm does not need any intermediate host for its development. The same holds true in regard to the round-worm of the cat, the dog, and very probably also to the large round-worm of the horse (*Ascaris megalocephala*).

The course of infection with ascaris is as follows: The eggs leave the intestines of their bearer with the fæces, remain for some time in damp earth and develop there, reaching the embryonic stage. The young worm reaches the digestive tract of man by means of impure water or earth, bursts the egg-shell, and, liberated, soon grows up as a sexually mature parasite.

The majority of helminths, as is well known, possess an intermediate host. Thus the human tapeworm (*Tænia solium*) lives as larva in the muscles of the pig, *Filaria medinensis*, in his immediate stage, in minute crustaceæ, occurring in drinking-water. *Distomum hepaticum*, mentioned above as the specific foe of sheep, passes his infancy in a small snail (*Limnæus truncatulus*).

An important point in the ascaris infection is the question as to the manner in which the ascaris eggs become scattered. In the foremost rank in this respect we have to place the irrational building of out-houses and general disposition of fæcal matters. Even in highly-civilized countries, such as Germany, the institution of privies is often of so primitive a character as to easily allow of the transmission of ascaris eggs, discharged with the fæces, to neighboring fields, gardens, and even water intended for drinking purposes. Only a solidly-built and carefully-closed well is safe against ascaris infection. In the court-yard, field, or garden the embryos enclosed in the eggs retain their vitality and capacity of development for a long time. It is clear that no great obstacles oppose themselves to the ingestion of the eggs after they are scattered over a court-yard or a garden. Children

* *Zoologischer Anzeiger*, 1886, p. 525.

playing with the sand, or workingmen employed there, might swallow them directly, or the eggs might be taken to the dwellings with sand sticking to the shoes and swallowed later. It is thus possible that infants, having never left the room, can become infected with ascaris. The creeping of small children about the room facilitates, of course, the infection.

The danger of acquiring the parasite is particularly great in farm-hands using fæcal matters as manure. Allow me to cite here an instructive case observed by Lutz, practising at the time in São Paulo (Brazil). The wife of a mason suffered from various digestive and nervous troubles. The microscopic examination of the fæces revealed an extraordinary quantity of ascaris eggs. The patient, treated at first with santonin, and later with thymol, discharged one hundred round-worms immediately and thirty more a few months later. The woman, who, according to Brazilian custom, never left the house, could have contracted the infection only in the house. The well was found to be in excellent condition, while the privy, which was of the most primitive nature imaginable, was at once suspected. The suspicion waxed into evidence when Lutz learned that the patient had from time to time used the fæcal matters as manure for her garden. Her husband, who was at work outside of the house, had remained uninfected. It is known that the infection may also be brought about by vegetables taken from such infected fields and cleaned imperfectly. Fruit picked up in the garden by children is a frequent factor of ascaris-poisoning. It is a noteworthy fact that the pig is a frequent transmitter of the ascaris infection, owing to its predilection of turning up fæces. The killing, too, of infected hogs can give rise to further infections. Lutz reports a case where the children of a German family became regularly infected whenever a hog was killed, which happened about once a week. To be sure, some authors, particularly Dujardin, deny the identity of the ascaris of the man with that of the hog. Still the morphological deviations are very insignificant, and can be explained by the great variability existing in the nematoides. Leuckart and Schneider are emphatic in regarding both species as identical, —a fact which the above-cited case of Lutz seems to prove too. It would be interesting to learn whether the employés of the great hog-killing establishments, who are engaged in cleaning the intestines of the animals, are more frequently attacked by ascaris than other people of the same town.

From the above explanations it will be seen why certain classes and certain ages are more liable to be attacked with ascaris than others. We can, therefore, mention as peculiarly liable to the infection farmers, the poor people in general, and the inhabitants of hot and unhygienic zones. I must also mention that the insane are extraordinarily frequent bearers of ascaris,—a fact to be explained by the lack of attention to cleanliness and hygiene shown by that class. It is left to explain why the parasite is particularly frequent in the fall. The explanation of this phenomenon is easy. The parasite needs one to three months for its development, and as the summer offers the best chances for the propagation of its eggs, we have to expect the grown-up worms in the fall.

In conclusion, it behooves us to recapitulate the hygienic measures and precautions which will protect us against the infection of ascaris. The arrangement, location, and seclusion of privies and closets is of prime importance. The same attention must be bestowed upon all wells, hydrants, and other sources from which our drinking-water is derived. In the hog-killing establishments the contents of the intestines and the water used to clean them ought to be burnt, especially rendered innocuous by boiling. All vegetables ought to be carefully cleaned before use. All worms found in man or animal ought to be burnt, and the fæces of infected persons be chemically treated ; for instance, by quicklime. Cleanliness, in one word, next to godliness, will, as in all instances, be the most potent safeguard also against this infection.

THE PHYSIOLOGICAL ACTION OF OUABAÏN.

By Joseph Sailer, M.D.*

(Continued from page 738.)

It now remains to account for the stage of increased rapidity of the heart's action. As in the preceding stage, one naturally turns first to the cardio-inhibitory apparatus, in order to see if any action here would account for the sudden alteration in the pulse. Obviously there are three ways in which this function could be affected in order to pro-

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duce the result that occurred,—first, by paralysis of the cardio-inhibitory centre; second, by paralysis of the cardio-inhibitory nerves; and, third, by the combined effect of both actions. Now it would be very difficult to definitely prove that the cardio-inhibitory centre was actually paralyzed, and it would be practically impossible to discriminate the third way from the second; but paralysis of the peripheral vagi is very easily tested by simply exposing one of the nerves and stimulating it with the induced current. Accordingly, a dog was taken, and prepared exactly as the dogs of Series A, excepting that a loose loop was passed around the right pneumogastric nerve. A moderate dose of the drug was employed (.003 gramme for 17.5 kilos). At two minutes the rate was 162 per minute; at two minutes and ten seconds it was 240, and the typical second stage was in progress. At two minutes and thirty seconds, when the rate was 225, the nerve was stimulated with a moderate current. In the succeeding ten seconds there were 43 beats, or a rate of 258; absolutely no result could be seen in the cardiogram. In ten seconds the electrodes were again applied to the nerve. In the following period of ten seconds there were but 35 beats, but this was by no means due to any action of the current, for the slowing occurred during the last two seconds, and not while the electricity was acting; and, indeed, it became evident within a very brief time that it was purely due to the rapidly-developing paralysis of the heart, for at three minutes and thirty seconds the cardiogram showed the straight line of death, broken but here and there by a slight elevation, to correspond to the decreasing respiratory movements. It is, perhaps, of value to note that the respirations showed a slight increase after the first stimulation, the rate increasing from 18 to 27 per minute. Perhaps this is due merely to the irregularity of this function that always occurred in the second stage. Perhaps it indicates that it is but the peripheral termination of the vagus that is paralyzed, and that the nerve-trunk, as must likewise have been the centre, was still intact. Fortunately, there are other experiments in this series.

In II. C a very small dose was employed (.001 gramme for seven kilos, repeated once). At three minutes the first stage was still pronounced; but, it being thought advisable to test the apparatus, the right pneumogastric was stimulated with a moderate induced current. Immediate arrest of cardiac movement resulted. When it resumed, the dog began to struggle violently, and the cardiogram became so irregular that it was impossible to count the beats. During this period, which lasted forty-five seconds, the blood-pressure suddenly rose, and when it became again possible to count the beats, it was evident that the second stage had been entered upon. The electrodes were again applied to the nerve from six minutes and twenty-four seconds to six minutes and thirty-two seconds. The heart's action did not cease, but a marked alteration occurred in the character of the cardiogram, and the rate dropped from 225 to 186. A moderate current was employed, but when at seven minutes the rate had again risen to 218, and the cardiogram had resumed its former characteristics, the secondary coil was made to cover the primary, and the nerve once more stimulated. Alteration neither in rate nor character occurred. The nerve had ceased to transmit stimuli. At seven minutes and fifty seconds a large dose of ouabaïn was thrown into the external jugular, and the heart suddenly stopped beating. If, from the first experiment, it might be concluded that late in the poisoning the pneumogastrics were paralyzed either in the trunk or the peripheral termination, it is evident that one can go two steps further in drawing conclusions from the second. For it is clear, first, that the pneumogastrics during the first stage are either normal or stimulated. Most unfortunately, I did not possess, nor had access to, the delicate electrical apparatus necessary to determine the response of the heart to small-measured currents acting upon the nerve, or I could easily have determined whether the heart in the first stage was stopped by a weaker current than that required to stop it before the drug was administered. But to return to the deduction: it is clear, in the second place, that the nerve or its terminals are paralyzed late in the second stage; and third, as I take it, the results of the second stimulation prove that this paralysis comes on gradually during the second stage, if an action that reaches completion in a stage that ordinarily occupies less than a minute can be called gradual.

III. C may be analyzed briefly. Its results are completely in accordance with the two preceding. Again, a minute dose was employed (.00075 gramme in eight kilos; as it was repeated four times, in the end nearly .004 gramme was injected, but the effect did not seem to be so marked as when a single large dose is used). At first there was no percepti-

ble effect upon the heart's rate, although the blood-pressure responded markedly to the action of the drug; but at twelve minutes, by the time the fourth injection was administered, the first stage had become well pronounced. At thirteen minutes and twenty seconds the rate was 108; at thirteen minutes and forty seconds it had risen to 144, and continued steadily to increase. At fourteen minutes and ten seconds the right vagus was touched with the wires for a moment. Immediate stoppage of the heart occurred, and about five beats were lost. As soon as the heart recovered, the increase in rate continued. At seventeen minutes the rate had increased to 116; at seventeen minutes and two seconds the electrodes were once more applied, a strong current being used. Immediate stoppage of the heart's action, accompanied by fall of pressure, occurred, and lasted for three seconds, the period of application. For the next ten seconds the cardiogram was very irregular. At seventeen minutes and twenty-one seconds, less than twenty seconds later than the last application, the vagus was again stimulated without perceptible effect. Dr. Reichert was kind enough to supervise my own applications, and then to apply the wires himself, so that there can be no error in the observation. It is clear, from this experiment, that, very shortly after the vagi are completely paralyzed, death ensues. This could not be demonstrated in the second experiment, because of the employment of a large dose of ouabaïn to kill the dog.

The cause of the final arrest of the heart is not so difficult to elucidate. Examples have already been given showing how sudden and rapid this arrest is. From the two experiments to determine the general action, as well as from several of the kymographic experiments, in which the dogs were opened after death, it was conclusively demonstrated that the heart-muscle was completely paralyzed, often failing to respond, within five minutes after death, to induced currents that caused violent contraction of the voluntary muscles. That this arrest took place as soon and as completely in the isolated heart may be shown by the following experiment:

I. D.	m. s.	Per min.
	.00	120
	.003 gramme.	
	.10	120
	1.10	132
	2.10	138
	2.40	126
	2.50	?
	3.00	0

The results of the other experiments, in which section of the cord and vagi was practised, are strictly in accord with this, and it is scarcely worth while to give them.

I.

The action of ouabaïn upon blood-pressure has necessarily been alluded to in the section upon its action upon the heart, but it will be expedient here to give it a more extended consideration. Like the pulse-rate, the blood-pressure curve may conveniently be studied in three stages. The first corresponds to the stage of cardiac inhibition. As a rule, there is a distinct but gradual rise of pressure during this period, especially marked when the heart's action is regular. The following table exhibits the results of the normal experiments; only the mean pressure is given:

m. s.	I.	III.	IV.	VI.	VII.
.00	73	75.5	55	46.5	56
	.003	.0015	.003	.002	.0025
.10	74	76.5	55.5	47.5	60
.20	76	81	58.5	51	...
.30	74.5	84	57.5	53	...
	.003				
.40	74	83.5	61	54	75
.50	75.5	83.5	64.5	53	72
1.00	74	87.5	70	54	70.5
1.10	79	87.5	73.5	55.5	70
				.002	
1.20	77	88	76	55	70
1.30	77	89	80.5	57	...
1.40	75.5	90	88	54.5	...
1.50	...	92	90	54	...
2.00	...	...	88.5	54	...

In these instances the rise is fairly constant and considerable; but it happened quite as frequently that, instead of a primary rise, there occurred a fall of blood-pressure in the dogs of Series A. In order to render comparison more easy, I have prepared another table, in which these cases also are collected:

m. s.	II.	V.	VIII.	IX.
.00	54	53	64	65
	.005	.0025	.005	.005
.10	56	51.5	72.5	71
.20	57.5	57	79.5	69
.30	55	61	67	69
.40	44.5	59.5	59	61
.50	34.5	53	55	64
1 00	...	55	51	56
		.0025		
1.10	...	54.5	54	59
1.20	34	56	58	66
1.30	40.5	54	64	...
1.40	43	40 5	...	...
1.50	47	41.5	...	...
2.00	50	27.5	...	...

It will at once be apparent that a point of difference between these two series of experiments lies in the size of the dose. In the first series, the largest amount injected at one time was .003 gramme, and the largest total amount .004 gramme, and this in a dog of twenty-two kilos. In the second series, .005 gramme was given in every case but one, and then .0025 gramme was repeated once; and except in this instance the dogs all weighed less than ten kilos. Evidently, then, the size of the dose has much to do with the effect of the drug. It is interesting, at this point, to refer to Series C, in which it was desirable, for the purpose of prolonging the action, to administer very small doses. Thus in I. C the dose was .003 gramme in 17.5 kilos. The record is as follows:

m. s.	Per min.
.00	54
.003 gramme.	
.10	58.5
.40	64.5
1.20	65.5
2.00	57.5
2.10	73
2.40	83
3.20	71
3.50	0

Here there is evident a fairly steady rise during the first stage; then a sudden marked rise during the second; and a final rapid decline, reaching the zero-point, it is worthy of note, some twenty seconds after the heart had stopped beating. In II. C this is even more regular. The dose was absolutely and relatively smaller (.001 gramme in seven kilos), and, although repeated, seemed to affect the dog less severely. I have observed in several experiments that repeated small doses, even when the aggregate is greater, seem to have less effect than a single large dose. The tracing gives the following record:

m. s.	Per min.
.00	66
.001 gramme.	
.10	66
.40	72
1.20	78.5
1.50	82
.001	
2.00	86
3.00	85.5
3.30	93.5
3.40	109

It will be noted that the rise is almost uniform. The injection of the second dose did, indeed, cause a temporary irregularity, perhaps due to the irregular heart action it produced, but a few seconds later, at three minutes, the steady rise had recommenced. Cardiac action was also disturbed on this occasion by stimulating one of the vagi, but without interfering with the upward movement of the mercury. But perhaps the most instructive record is that of the last experiment of the present series. A very minute dose was employed (.00075 gramme for eight kilos), and, although repeated four times, in no instance did there appear to be any immediate result from the injection. Again, the heart for a long time was scarcely affected. The following are a few extracts showing the general run of the curve:

m. s.	Per min.
.00	64
.00075	
.10	62.5
1.00	61.5
2.00	61
.00075	
2.30	62.5
3.20	66.5
4.20	67.5
5.20	67
.00075	
5.40	67
6.40	67
Stopped 4 minutes.	
11.00	68.5
.00075	
11.20	69
11.40	74
12.20	81.5
13.20	89
13.40	102

It is very clear from this table that there is, under a moderate dose, a continuous rise in blood-pressure. As in the other tracings, this is progressive up to a certain point, when it increases suddenly, slowly reaches a higher point, decreases again, and finally falls rapidly to zero.

To determine the influences producing the various changes in the vascular system is much more difficult than to determine those of the heart. Taking first the primary rise that occurred in the majority of the experiments, it is obvious that it can be accounted for in three ways,—namely, first, increased cardiac action; second, stimulation of the vaso-motor centre; third, stimulation of the peripheral vaso-motor nerves or the walls of the arterioles themselves. Practically it is so difficult to distinguish the two conditions under the third head that it is not worth while to separate them. Whether or not the vaso-dilator nerves are concerned is scarcely important, and as it is not yet determined

that their action is continuous, it is possible that they might be affected without producing any alteration in the tracing. Leaving the heart for the time being, it can most readily be demonstrated whether the vaso-motor centre itself is acted upon. This is done by section of the cord and pneumogastric nerves, of course employing artificial respiration, unless the section be very low, and noting if the pressure still rise and to what degree. Numerous experiments were made to decide this point; but, unfortunately, in only two of them am I sure that the division was complete. At first I relied upon the symptoms of paralysis, and neglected to dissect the part; but, having found this an uncertain guide, I performed careful autopsies upon the last three dogs, with the results of finding in the one the cord only partially cut through, and in the other two complete section. As a matter of fact, whether it was certain or not that the spinal cord was completely severed, the result was always the same. Blood-pressure rose steadily and persistently, and very considerably, until near the moment of dissolution. On the other hand, cardiac action was not, or but slightly, accelerated; and the cardiograms were, if anything, weaker under the influence of the drug than without it. In I. and II. D successful attempts to cut the cord were certainly made. The first dog weighed twelve kilos, the second eight kilos:

m. s.	I. Per min.	II. Per min.
.00	8	15
	.003	.005
.10	9	15.5
.40	12	28
1.20	15.5	49
1.40	17	51.5
	.002	
2.00	20.5	60
2.20	24	57
2.40	19	57
3.00	3	51
3.30	...	5

There is but little comment to make in either instance. The two experiments, agreeing, as they do, so closely, prove conclusively to my mind that the vaso-motor centre is certainly not the point on which the drug acts in order to cause the rise in blood-pressure. In both cases the cord was completely cut in the cervical region, and artificial respiration was required. In I. the dog was profoundly shocked, but recovered well when the tube was inserted. The drug was not administered until the heart's action had been steady for some minutes. I tabulate for reference the remaining experiments. The first two comprise the dogs in which paralysis was taken to indicate complete section of the cord. The third is the dog in which the autopsy showed the cord but partially severed, the right lateral column and anterior root zone remaining intact.

SERIES D.

m. s	III. 11 kilos.	IV. 5 kilos.	V. 11½ kilos.
.00	46	53	53
	.005	.003	.003
.10	47	55.5	63.5
.40	65	70.5	94
1.20	74	89.5	106
2.00	79	86.5	90
	.005		
2.40	79	12	0
3.20	16	...	...

Evidently if, when the influence of the vaso-motor centre is wholly or partially withdrawn, the blood-pressure can still rise so rapidly, the rise occurring in the normal animal can scarcely be supposed to be due to stimulation of the centres in the medulla. It is, perhaps, permissible to draw an inference here regarding the primary slowing of the heart. It is uncommon for a drug to stimulate the cardio-inhibitory centre and depress the vaso-motor centre at the same time, or to act in any manner upon the cardiac centre without influencing the vaso motor centre. As it is highly probable, then, that some portion of the inhibitory mechanism of the heart is stimulated during the early stage of the administration of ouabaïn, and as it seems unlikely that the vaso-motor centres are acted upon, it seems reasonable to suppose that it is the pneumogastric nerves that feel the effect of the drug. This is rendered more probable by the known fact that these same vagi are, in the later stage, depressed, and finally paralyzed. A further argument in favor of this primary stimulant action, followed by depression and paralysis, is seen in the study of the frog's heart, where exactly this sequence is followed, although the first effect is so great as to stop cardiac action, and the paralysis can only be demonstrated after relaxation ensues, by application of the electric current. It would seem almost as if the vaso-motor centre were depressed by the drug, so that when it is cut off, the stimulating effect upon the peripheral vaso-motor system can show its true magnitude, for rarely in the experiments of Series A is there anything like the same amount of rise. The question, however, is too complicated to be so easily decided. When the blood-pressure

is raised by spasm of the arterioles in the normal dog, there is coincidently stimulation of the cardiac centres of the medulla, and the heart's action is slowed (Brunton); this slowing, of course, reduces blood-pressure again, and a state of equilibrium is maintained. Under abnormal conditions, the centres make the same effort to maintain a normal pressure, with more or less success. If, however, the vagi are divided, it is impossible that the effort of the centre be manifested. Indeed, the stimulation of the accelerator nerves in the cervical sympathetic might, under some circumstances, be sufficient to cause acceleration of the pulse, this in time serving to further increase the pressure. Hence it cannot be asserted that, because the increase in blood-pressure is more marked in Series D than in Series A, the vaso-motor centre is, therefore, from the first depressed by ouabaïn, although not enough to overcome the vascular spasm. It is not, however, absolutely true that the rise from the moment of injection is invariably more marked in D than in A, for in I., of the former series, in which the cord was undoubtedly cut, the rise was only relatively pronounced.

Regarding the influence of the heart, the question is not, Does the heart influence blood-pressure? for the heart must always, by the rapidity and force of its contraction, have a decided influence upon arterial tension, but rather whether the alterations in the height of the column of mercury are due wholly or in great part to the changes in this organ. Various methods have been devised to determine this point. Perhaps the least reliable is the microscopic observation of the arterioles in the mesentery of a rabbit to which the drug has been administered, and its value is not greatly enhanced by the modification of the so-called jury system. Indeed, I know of an instance in which the gentlemen engaged were unable to agree as to whether contraction or dilatation occurred. Observing the variations in the movement of the needle during the ventricular diastole, artificially slowing the heart, if necessary, by stimulating a pneumogastric with a weak current, is perhaps of more value; but either because the conditions were unfavorable, or, as is more likely, because I have not yet acquired sufficient skill in analyzing tracings, I was unable to derive any information from this source. Probably the most reliable method is the performance of cardiectomy upon the tortoise and passing a normal salt solution or defibrinated blood through the vessels, noting carefully the alterations in tension induced by the addition of the drug to the liquid. This required apparatus to which I did not have access. As a result, I was compelled to depend upon the old method of comparing the pulse and the pressure-curves to discover whether they were parallel or divergent.

The following records of experiments show, as well as figures can, the results obtained:

I.

m. s.	Pulse.	Pressure.
.00	114	74
	.003	
.10	114	74
.20	102	76
.30	90	74.5
	.003	
.40	102	74
1.00	84	74

II.

m. s.	Pulse.	Pressure.
.00	162	54
	.005	
.10	150	56
.20	132	57.5
.30	120	55
.40	108	44.5

III.

m. s.	Pulse.	Pressure.
.00	231	75.5
	.0015	
.10	222	76.5
.20	222	81
.40	216	83.5
1.20	186	88
2.00	156	91

IV.

m. s.	Pulse.	Pressure.
.00	163	55
	.003	
.10	156	55.5
.20	114	58.5
.30	84	57.5
.40	72	61
1.00	72	70

Without going further, it will, I think, be apparent, from the results of Series A, that, if this method be correct, the vaso-motor system is affected independently of the heart, at least during the first stage. Thus, while the pulse-rate falls in III., the pressure rises, and a beautiful crucial effect is produced. This is even more pronounced in IV., and is clearly indicated in all the others.

I.

m. s.	Pulse.	Pressure.
.00	210	72.5
	.002	
.10	210	77.5
.30	222	89
1.00	252	98
1.30	252	102

III.

m. s.	Pulse.	Pressure.
.00	258	85
	.002	
.10	246	85
.20	252	91
.30	246	95
.40	192	95

It does not appear to be so well marked in Series B, excepting in III., where it is quite decided. In I. the pressure rises at first much more rapidly than the pulse, confirming the induction of a primary vaso-motor spasm. Parallelism is, however, pronounced in II. and IV.

rise occurs in V. of this series (in which, it will be remembered, complete division was not secured). In this the pressure rose from 53 millimetres to 115 millimetres in one minute and ten seconds, while the pulse-rate advanced from 156 to 168 per minute, and then fell to 144 in the same period. Then,

I.

m. s.	Pulse.	Pressure.
.00	117	54
	.003	
.10	120	58.5
.20	102	61
.30	84	66
1.00	102	69

II.

m. s.	Pulse.	Pressure.
.00	228	66
	.001	
.10	222	66
.30	210	67
.50	180	75
1.10	150	78.5
1.30	126	80

III.

m. s.	Pulse.	Pressure.
.00	132	63.5
	.00075	
.10	138	62.5
	.00075	
2.30	138	62.5
	.00075	
5.40	152	67
	.00075	
11.20	138	69
12.20	90	81.5
13.20	108	89

In Series C, where, perhaps, on account of the smallness of the dose, the delicate indications are exaggerated, this primary spasm is very clearly seen. In I. and II. it is quite pronounced, and although developing more tardily in III., in the end it is here also very evident. The same holds true for

although the pulse-rate fell at a single beat to 48, and never afterwards rose above 66, the pressure remained above 100 until two minutes and ten seconds, then fell slowly, then more suddenly, until at three minutes it was zero. I give here the records of the other experiments of this series :

I.

m. s.	Pulse.	Pressure.
.00	120	8
	.003	
.10	120	9
.50	132	14.5
1.50	132	18.5
	.002	
2.20	144	24

II.

m. s.	Pulse.	Pressure.
.00	180	15
	.005	
.10	180	15.5
1.00	192	42.5
2.00	174	60
2.30	162	56

III.

m. s.	Pulse.	Pressure.
.00	198	46
	.005	
.10	198	47
.30	210	59
1.00	228	69
1.30	222	76
2.00	210	79

IV.

m. s.	Pulse.	Pressure.
.00	156	53.5
	.003	
.10	150	55.5
.40	162	70.5
1.20	162	89.5
2.00	180	86.5

Series D, and, as has already been said, it indicates the peripheral character of the spasm, for the great vaso-constrictor centre is absolutely shut off when the cord is severed. Perhaps the most extraordinary example of the rapidity and magnitude of the pressure-

In these the vaso-motor spasm is well marked. Even in I., in which the dog suffered from profound shock during the operation upon the cord, yet, although the pressure remains low, it clearly rises out of proportion to the pulse-rate.

It seems to me, then, to be conclusively demonstrated that ouabaïn, injected into the external jugular vein, has an effect upon the vaso-motor system independent of that which it exerts upon the heart, and causes a vaso-motor spasm, either by stimulating the peripheral vaso-motor nerves or by acting directly upon the walls of the arterioles. In a few cases, however, a fall of pressure occurred, associated, it will be remembered, with large relative doses. It was also invariably associated with great reduction of the cardiac rate, a reduction closely corresponding to the fall of pressure, and to my mind explaining it. There is one exception to this. IV. B shows a fall of pressure without corresponding fall in pulse-rate, and is at present inexplicable to me. It is easy to suggest that some unsuspected disturbing element affected the experiment; but, unfortunately, such an explanation is little satisfactory, however plausible, in scientific investigation.

The rise in pressure in the second stage corresponds closely to the increase in the pulse-rate, and can readily be explained by it. That it does not depend upon this alone is evidenced by the results appearing in Experiments III. and IV. of Series A. Thus, in III., at three minutes, the pulse-rate was 168 and the pressure 95. At five minutes and ten seconds the figures were: pulse 174 and pressure 119; at five minutes and thirty seconds, after the injection of .003 gramme of ouabaïn, 168 and 124.5; at five minutes and fifty seconds, 225 and 120.5. Here is a rise of pressure entirely disproportionate to the increase in pulse-rate and not to be explained by it. In IV. the rate at two minutes and thirty seconds was 252, the pressure 93. At three minutes it was 240 and 94. At three minutes and thirty seconds, 220 and 106; again a disproportionate increase of the pressure.

As blood-pressure does not fall to zero until some seconds after the heart has ceased to beat, it may be inferred that ouabaïn does not act so fatally upon the non-striated muscles of the arteries as it does upon the heart. Indeed, it seems to act upon the heart-muscle with peculiar rapidity and virulence. Perhaps, as M. Arnaud suggests, we shall some day discover a certain chemical nucleus, whose combinations have their dominant action upon the branched, striated myocardium.

In conclusion, then, it appears that ouabaïn causes, first, a slowing of the pulse, due to a stimulating action upon the cardio-inhibitory function, and perhaps partly to a direct action upon the heart-muscle. At the same time there is a primary vaso-motor spasm, due to an action either upon the vaso constrictor fibres or the muscular coats of the vessels. The slowing of the heart may be so marked, in exceptional instances, as to overcome the vaso-motor spasm and cause a fall of pressure. Then there is a sudden and great increase in pulse-rate, caused by depression and final paralysis of the vagi, and, at the same time, increase in pressure, due partly to increased heart-action and partly to continued stimulation of the vaso motor system. At last the heart-muscle is paralyzed, and in a few seconds the pressure also falls to zero.

II.

I have already alluded to the statement of MM. Varigny and Langlois that animals to whom ouabaïn has been administered die with well-pronounced symptoms of asphyxia, and I have already unqualifiedly rejected it. In my notes of the various experiments performed upon dogs, I find that special mention is made of the continuance of respiratory action after death in Experiments I., II., III., IV., V., VIII., and IX., out of nine experiments in Series A, and in VI. the dog was killed by chloroform. In Series B, in which the vagi were cut, it is mentioned in Experiments II., III., and IV., out of four experiments. In Series C, in which the dogs were practically normal, in Experiments I. and III. out of three, and in II. the dog was killed by a massive dose of ouabaïn. Indeed, after the record of III., I find a note stating that respiration continued until twenty minutes and forty seconds, cardiac movement having ceased at seventeen minutes and fifty seconds, there being thus nearly three minutes before paralysis of the respiratory centre finally ensued. Finally, in Series D, in Experiments III. and IV., in which the cord was cut in the dorsal region, I again find the persistence of respiratory action noted,—in III. for forty seconds. In V., in which the cord was not quite severed in the dorsal region, although complete paralysis promptly ensued and remained, there were, after the heart had ceased beating, and the canula had been removed from the trachea, peculiar movements of drawing the head forward, caused by contraction of the sterno-laryngeal muscles. Now, as these are accessory muscles of respiration, and probably draw their nerve-supply from a point above the section of the cord (the exact location of the section, beyond the fact that it lay between the third and sixth

cervical vertebræ, was not ascertained), it seems likely to me that these movements were but manifestations of vigorous respiratory impulses emanating from the centre. If this induction is correct, it forms another link in the chain of evidence that supports the suggestion that the bulbar centres are not greatly affected by ouabaïn, and would locate the seat of its action on the cardio-inhibitory function in the peripheral part.

These results, added to the invariable distention of the ranine lung in the numerous experiments I performed upon frogs, seem to me sufficiently conclusive, for it is to be remembered that in none of the experiments not adduced as examples is there any suggestion at all that the pulse continued after respiration. Nevertheless, MM. Varigny and Langlois make these most positive statements: "More often it produces a respiratory slowing, and the heart survives the respiration some minutes. In order to exclude the risks of direct action upon the endocardium, we prefer to inject the poison (always by the veins) in very diluted dose,—that is to say, a dose of a milligramme in a cubic centimetre of water,—and dividing the injection. [My own injections were always considerably more diluted than this.—J. S.]. Under these conditions we observe the following: If the dose be weak, four milligrammes for a live weight of six kilos, 300 [it must be remembered that these gentlemen did not use ouabaïn, but the crude drug, as prepared by the natives.—J. S.], one observed, at the end of one or two minutes, sometimes less, a pronounced respiratory slowing, without well-marked cardiac troubles. This slowing lasted one or two minutes, and was gradually dissipated. The animal recovered without difficulty and without other troubles. With stronger doses (eight milligrammes for a weight of five kilos, 550, injected in four parts, in a half-hour) the first troubles manifested themselves again on the side of respiration. There is produced acceleration of brief duration, but well marked, and which is almost at once followed by a retardation, gradual enough, but which does not last more than from one to three minutes. This retardation goes on to complete arrest, the heart continuing to beat for some time, but slowing also, to finish by being arrested." The arrest of the heart, they admit, cannot be prevented by artificial respiration, but they affirm that there is a dose that will arrest respiration, but not the heart. "In the presence of these results," they continue, "it appears to us legitimate to conclude that the action of ouabaïn is upon the centres of innervation of the respiration and the heart,—that is to say, upon the medulla." MM. Gley and Rondeau also believe that "ouabaïn exercises a real action upon the medulla, as is proved by the varied respiratory troubles that follow the administration of the substance." Rather slender grounds for the conclusion, it seems to me.

The following (see page 823) is a table of my own results with this function.

These results confirm, in some measure, the statement of MM. Varigny and Langlois, that there is a slowing, followed by an acceleration, of the rate. The slowing did not appear in II., nor the acceleration in V. and VI. Occasionally, as in IV., the acceleration was very pronounced, and in such cases occurred during the moment of dissolution. In III., of Series C, the respiratory rate was not taken during the experiment, but at death, just after the heart stopped, it is recorded upon the sphygmogram as rising to the enormous rate of 276 per minute, and this lasted some seconds. My attention was attracted to the dog at this time. The respiratory sounds could not be discriminated, but sounded like a low, continuous hiss. The movements were exceedingly shallow; the hand placed upon the thorax perceived a rapid tremor, and the muscles rigid with the tremendous exertion. As in both this instance and in IV., where the rate reached 108 per minute, the acceleration occurred about twenty seconds after the heart had ceased to beat, it seems to me that it can be readily accounted for by ascribing it to the stimulating effect upon the respiratory centre of the unrefreshed blood, ending, of course, in rapid paralysis. As the period of slowing almost invariably occurred in connection with rising pressure, it may be explained by that fact; for, when the centre receives a greater supply of oxygenated blood, the rate is slowed. The ordinary acceleration always occurred during the second stage, and must in some manner be connected with it. But its rapid, shallow character is very unlike that of depressed vagi. If it be true that, in this second stage, there are contractions of the arterioles, it may be that the medulla is, in fact, anæmic, and hence stimulated. But one is almost tempted to ascribe the increase in rate to centric action, as is indeed commonly done when the experiments have not suggested anything else. But there is no more reason for adopting this explanation than any other. MM. Gley and Rondeau, however, consider the irregularities in the

respiratory rate to be proof that the action of ouabaïn is centric. Certainly irregularity is often marked, for sometimes the respiration will be delayed in expiration, sometimes in inspiration, and in one instance there was a beautiful tracing of Cheyne-Stokes respiration. I do not believe, however, that the premise is correct.

Series B, in I., II., III.; in Series C, in I., II. In all these the convulsive action included all four extremities. In Series D no convulsions occurred except in IV. In this instance the cord was cut in the dorsal region, and the convulsion occurred in the anterior extremities alone, thus indicating that the disturbance was cerebral. As these con-

m. s.	I.	II.	III.	IV.	V.	VI.	VII.	A.	I. C.
.00	18*	...	...	...	45	24	42	...	18
.00	24	12	26	34	45	24	42	...	15
.10	18	12	27	30	45	24	60	...	15
.20	18	12	24	30	48	24	...	...	15
.30	17	12	24	33	45	24	...	...	15
.40	24	12	24	27	36	24	54	...	12
.50	18	12	21	36	42	24	45	...	18
1.00	21	...	...	30	42	24	24	...	18
1.10	24	...	15	24	33	23	30	...	18
1.20	24	36	18	20	21	24	48	...	18
1.30	24	36	18	24	15	21	...	...	15
1.40	24	42	21	24	21	18	72	...	12
1.50	...	42	21	24	21	18	...	...	12
2.00	...	36	24	42	30	18	...	...	9
2.10	...	...	...	60	...	...	54	...	6
2.20	34	36	...	54	39	...	0	...	18
2.30	30	60	...	36	39	...	...	...	18
2.40	24	52	18	48	36	18	...	...	18
2.50	18	...	18	60	36	18	...	...	27†
3.00	60	24	18	18	42	18	...	...	18†
3.10	84	12	15	36	36†	21†	...	...	12
3.20	84	...	...	48	36†	21	...	...	9
3.30	...	...	...	40	42†	24	...	...	9
3.40	...	...	...	30	...	18	...	...	0
3.50	...	...	...	27	...	15	...	...	...
4.00	...	...	...	30	...	...	...	...	...
4.10	...	...	...	108	...	...	...	...	...
4.20	...	...	...	...	18	...	...	...	...
4.30	...	...	...	...	21	...	...	...	...
4.40	...	...	...	...	15	...	...	...	...
4.50	...	...	...	...	12	...	...	...	...
5.00	...	...	...	...	12	...	...	...	...

* These figures represent the rate per minute.

† Stimulated right vagus.

III.

The action of ouabaïn upon the nervous system presents many interesting features. To elucidate these I have depended mainly upon the frog; but it will be best to preface the study of these experiments by a few results gleaned from my work upon mammals. From the second general experiment upon the dog, it is evidenced that there is a stage of cutaneous anæsthesia. As the reflexes appear to be abolished, although co-ordination was preserved, it seems to me that the affected point must be below the cord, and therefore in the trunk or sensory nerve endings. Probably the latter, as the results of the work on frogs, to anticipate a little, do not indicate that the nerve-trunks are paralyzed before death, and it is, indeed, evident that in dogs the motor nerves remain intact.

Another interesting phenomena was the frequent occurrence of a brief tetanic convulsion terminating the sphygmographic studies. This occurred as follows: In Series A, in Experiments II., III., IV., VII., IX.; in

vulsions do not occur in frogs, the following quotation from Landois and Stirling's "Physiology" will, I take it, serve as an explanation for them: "In the medulla oblongata, just where it joins the pons, there is a centre, whose stimulation causes general spasms. This centre may be excited by suddenly producing a highly venous condition of the blood ('asphyxia spasms'), in cases of drowning in mammals, but not in frogs.' And this from Lauder Brunton: "If any drug, therefore, produces convulsions in the higher animals and not in frogs, the probability is that its convulsant action is indirect and the convulsions it produces are asphyxial."

In these investigations one obtains but little assistance from the literature of the subject, for MM. Varigny and Langlois state that "ouabaïn does not appear to exercise any effect upon sensation, motion, or the reflexes." And MM. Gley and Rondeau maintain a prudent silence regarding the nervous system.

In considering the frog, I shall not undertake to make close analyses of all the experiments performed upon these animals. They were quite numerous, and yielded very concordant results. I have already given a brief description of the general action upon this animal. The diminished reflexes were noted, and also what, I think, the probable explanation,—namely, the condition of general anæsthesia. As in dogs, I believe this to be due to paralysis of the peripheral sensory nerves, for the nerve-trunks seem not to be wholly paralyzed at the moment of death. The nerve-trunks, however, are certainly affected by the drug. Thus in one case a moderate dose was employed; injected at 7.56 P.M. This experiment is somewhat remarkable, and I give the details briefly:

7.58 Respirations rapid and vigorous; the lower jaw is dropped.
8.00 Still very active.
8.05 Mouth closed.
8.08 Reflexes abolished; apparently complete anæsthesia and relaxation.
8.14 Muscular spasm; the muscles immediately relaxed; probably dead.

This is the only record of such an event that I can find in my notes. At present I cannot recollect whether it was a true spasm, or an effort to jump, or one of the swimming movements. At any rate, it occurred just before death.

8.17 All muscles respond to the faradic current.

Section.—Lung expanded; ventricle arrested in systole; not responsive to faradic current; sciatic nerve stimulated, followed by contraction of the muscles of the leg. Frog decapitated,—*i.e.*, all cardiac nerves cut,—but the ventricle remained contracted.

8.45 Muscles and nerves no longer respond to galvanic stimulus.

This was entirely too soon for absolute neuro-muscular paralysis to occur. The fact that the muscles did not respond when the electrodes were applied directly to their substance, indicated that their parenchyma was paralyzed, and that their motionless state did not depend upon the nerve paralysis. But the experiment did not prove that the nerves were paralyzed at all, for, supposing that they were not, how could it be demonstrated if the muscles were passive? This experiment was frequently repeated, with essentially the same results, except that in some cases the condition of paralysis to electric stimuli occurred at a shorter interval after death.

In order to satisfy myself that ouabaïn and not death affected the muscles, I tightly ligatured one leg of a frog above the knee, and then administered the poison. In every experiment the muscles below the ligature seemed endowed with immortality, and I invariably gave up in despair the attempt to discover how long they maintained vitality. I at least convinced myself that it was several hours. Among this series occurred the following interesting experiment. It shows, perhaps, better than any other, the alternations of the phases of profound paralysis and voluntary movement. I therefore give the details. The animal was small. A tight ligature was placed around the right thigh.

4.08 A large dose of ouabaïn injected hypodermically.
4.11 Still active.
4.12 Swallowing air rapidly.
4.14 Sensation good.
4.15 Sensation much impaired.
4.16 No effort made to turn over when laid on back.
4.17 Temporary gasping movements.
4.18 Swimming movements.
4.19 Sensation absolutely abolished; apparently dead.
4.24 Swimming movements.
4.25 Dead.

Section.—The ventricle arrested in systole; the auricle dilated and full of blood; the lungs greatly distended.

Electrical Reactions; Faradic Current.—Left leg at first fully responsive, but later requiring stronger and stronger currents. The sciatic nerve was exposed, and at first contraction was produced when it was stimulated by a moderate current; but later there was no response to the strongest. In the right leg the muscles were throughout responsive to the weakest current. Stimulation of the sciatic nerve by the weakest current caused contraction in the muscles of the leg.

It now remained to discover if the nerve was or was not paralyzed. In order to accomplish this, the sciatic of one leg was dissected out, and a ligature passed under it and around the leg. I prefer this to ligation of the femoral, as it practically prevents osmosis, an important consideration in experiments that must be continued some time after death. One of the experiments yielded the following results:

8.50 Hypodermic injection of moderate dose of ouabaïn.
9.12 Up to this time the animal had made frequent efforts to vomit, and had grown progressively

weaker, although sensation remained good and it moved away from irritation.

9.14 Sensation to pressure upon the ankle was gone, but quite good when the nerve-trunk itself was stimulated.

9.24 Sensation to pressure in the right ankle still faintly evident (the ligature had been placed around the right thigh), but completely abolished on the left side.

9.25 Sensory functions of left sciatic almost abolished and reflexes much delayed; response of right sciatic very prompt.

9.26 Sensation wholly abolished in both nerves; motor functions of both good and apparently equal.

9.28 Dead; has become enormously distended in the last five minutes.

9.34 Left sciatic requires a stronger current than the right to produce the same effect.

9.37 Right gastrocnemius responds promptly and vigorously; left, very feebly.

9.38 Muscles of back respond to moderate current.

9.39 No response in left leg; very marked response in right leg.

9.50 Abdomen opened and lumbar plexuses exposed.

9.54 Muscles of right leg respond to stimulation of either lumbar plexus; those of left leg motionless.

10.05 Muscles of all parts of body fail to respond to the electric current, except in the right leg, where contraction is prompt and vigorous to a weak current.

This experiment was often repeated, and always with the same results. It proves, I think, that ouabaïn is a powerful muscle poison, paralyzes sensation, and perhaps later the nerves.

I regret not having had opportunity to make myographic studies in the investigation of this drug, for at times the dying muscle would give a sudden sharp contraction, and then immediately relax, although the stimulus was continued, or, again, it would respond so sluggishly that it almost seemed as if it were not going to respond at all.

I had yet to prove that the nerves were paralyzed. To accomplish this, I carefully dissected out the sciatic nerves and gastrocnemii muscles of both legs of a frog; then preparing a solution of ouabaïn and placing some of it in a watch-glass, I placed the nerve of one preparation (*A*) and the muscle of the other (*B*) in the liquid, and allowed the attached part to rest outside. The notes of the experiment read as follows:

10.14 Nerves and muscles of both preparations respond to the weakest current.

10.25 (Weak current.) *A*. Stimulation of the nerve fails to cause contraction in the muscle; the muscle responds readily. *B*. Muscle responds feebly and sluggishly when stimulated (current probably deflected by the moisture), but vigorously when the nerve is stimulated.

10.34 (Strong current.) *A*. Stimulation of the nerve causes contraction in the muscle, about equal to the contraction produced by direct stimulation of the muscle. *B*. Muscle responds less vigorously when stimulated than when the nerve is stimulated.

10.50 (Strongest current.) *A*. Nerve is seemingly paralyzed, and does not transmit stimuli, excepting a small portion next the muscle that was out of the solution; the muscle responds vigorously and promptly. *B*. The muscle responds feebly and sluggishly, and no better when the stimulus is applied to the nerve.

11.05 (Strongest current.) *A*. Nerve completely paralyzed; muscle unimpaired. *B*. Muscle completely paralyzed; stimulation of the nerve does not affect it.

It is clear, then, that when exposed to a strong solution of ouabaïn, the nerve becomes completely paralyzed, and that the muscle becomes far more rapidly paralyzed than if it were exposed to the atmosphere. To summarize the action of ouabaïn upon the neuro-muscular system, it may be said,—

1. That it diminishes and finally abolishes reflex action by paralysis of the peripheral sensory nerves, and this paralysis then extends to the sensory nerve-trunk.

2. That it paralyzes the striated muscles by direct action upon their tissue.

3. That it paralyzes the motor nerves only when the action in the body is very prolonged or when a strong solution is applied directly to the nerve.

4. There does not appear to be any action upon the central nervous system.

In a communication published in the *Comptes-Rendus de la Société de la Biologie* in 1889, M. Gley calls attention to the remarkable local anæsthetic action of strophanthin and ouabaïn. "Four drops," he states, "of a solution of 1 to 1000 of either of these substances, instilled into the eye of a guinea-pig, suffice to produce at the end of five minutes a very marked diminution of corneal sensibility. After three or four minutes more the anæsthesia is nearly complete; one can touch and prick the cornea without causing a reflex. This anæsthesia may last several hours (two or three); it diminishes in course of time, but during more than one hour and a half it remains almost absolute.

"Moreover, at no time was there the least inflammation; the eye did not appear at all irritated; the state of the little vessels remained the same." He adds that, in the case of one dog, there were signs of pain without inflammation. Further, that the anæsthesia is accompanied by a marked myosis which

commences in half an hour, and later brings the pupil to a pin-point. In a second communication he adds to this that there was noticed a notable augmentation of the volume of the eyeball and increase of intraocular tension.

Desiring to experiment upon this point, I had prepared an alcoholic solution of ouabaïn of such strength that one drop equalled .001 gramme. This worked very well at the first experiment, but for some reason failed to produce any effect afterwards. As a result, I have but one experiment to record. In performing this I was fortunate in having the assistance of Dr. C. A. Oliver, who determined points that I should not have been able to observe.

The animal used was a rabbit. The record is as follows:

Pupil, O. D., 5 × 6, long axis vertical.
O. S., 6 × 7, long axis vertical.
Tubercular choroiditis more marked in O. D.; O² corneal reflexes good.
8.45 Three drops of a solution 1 to 1000 in O. S.
8.52 Pupil dilated to seven millimetres; epithelium of cornea thickened.
8.54 Cornea much less sensitive; reflex occurs only after prolonged pressure with the cotton point.
8.58 Cornea, O. D., extremely sensitive.
9.00 O. S, pupil in strong light, 6 × 7; O² tension equal (normal).
9.05 Retinal arteries and veins as before instillation; media clear.
9.10 Three drops in O. S.
9.14 Cornea completely anæsthetic; tension normal; pupil, 7 × 8; responds to light.
9.20 Pupil comes down to 5 × 6 in strong light; cornea hazy and punctiform; corneal epithelium clearer.
9.24 Pupil, O. D., comes down to 5 × 6 in bright light; cornea, O. S., still anæsthetic; experiment abandoned.

The following morning the pupil in O. S. was found to be 6 × 7; the corneal reflex was good; conjunctiva not injected; O² tension normal. It follows from this that ouabaïn in very dilute solution will produce corneal anæsthesia. No definite action was manifested on the pupil or intraocular tension. But a single experiment is not conclusive, and, owing to some change in the solution, four others that I performed were failures. Drs. Hare and De Schweinitz have experimented with strophanthin, and found that, although it produces complete corneal anæsthesia in dogs, it produces intense inflammation in the human eye. In view of this, it is obvious that in experimenting on the human eye with ouabaïn the most minute doses should be at first employed. I know of no reason, either histological or physiological, that would account for this great difference in the results obtained upon men and the lower animals.

A few points concerning the general action of the drug remain to be noticed. It is a powerful emetic, and acts as such when injected subcutaneously. This action it shares, I believe, with the majority of muscle depressants. It promotes defecation, perhaps, by increasing peristalsis. It is a diuretic; at least it seems always to cause urination in the animals to which it is administered. I can think of no reason, unless it be increased blood-pressure or paralysis of the sphincter. Lastly, it does not appear to affect body temperature.

This completes the account of my experiments with ouabaïn. Whether the drug will ever be of practical value, time alone can determine. Abroad it has already been employed with asserted good results in pertussis in doses ranging from $\frac{1}{1000}$ to $\frac{1}{500}$ of a grain. It would seem that very minute doses might have the same action as digitalis; but its greatest value will probably be found to exist in its power as a local anæsthetic, which is certainly superior to that of cocaine. For the present, we must be content to know that it is extremely poisonous.

A NEW VERMIFUGE.

Attention has recently been directed by MR. HECKEL to a Scitamineous plant, which he has named *Ceratanthera Beaumetzi*, and which, under the names of "dadigogo" and "balancofouna," is employed on the west coast of Africa as a tænifuge and purgative (*Bulletin Général de Thérapeutique*, October 15, p. 336). The part used is the fresh rhizome, from which M. Schlagdenhauffen has separated a resinous substance, soluble in ether and petroleum, and an essential oil. The resinous extract, administered in doses of 1.20 grammes, acted only as a purge. On the other hand, 20 drops of the essential oil, given in a gelatin capsule, followed by a dose of castor oil, caused the complete expulsion of the tænia. This result is supposed to explain a previous want of success by Dr. Beaumetz, when using the rhizome in a dried condition.—*Pharmaceutical Journal and Transactions*, October 31, 1891.

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Leading Articles.

HYGIENIC AND CURATIVE TREATMENT OF NON-DIPHTHERITIC ANGINA.

ANDRÉ MARTIN has published in the *Bulletins et Memoires de la Société de Médecine Pratique* a paper on the above subject, in which he counsels greater antiseptic precautions in the treatment of those affections of the throat designated as simple or catarrhal, erythematous, and tonsillar angina, the origin of which has been referred in the past to atmospheric conditions, cold, humidity, etc. He regards simple acute angina, whether occurring idiopathically or in connection with influenza, measles, scarlet fever, or even typhoid fever, as essentially of infectious nature. It cannot be too much borne in mind that cosmical conditions are impotent of themselves—without bacterial influence—to produce catarrhal affections, and that cold and heat act principally by diminishing that phagocytosis which opposes to the penetration of germs an insurmountable barrier. When this barrier is broken, the field is clear, and the bacteria, which were vegetating, inoffensive, in the saliva, enter the circulation to localize themselves, according to the individual predisposition, in the pharynx, the lungs, or the pleura.

These considerations, Dr. Martin says, have led him the past two years to adopt a different kind of treatment from that which he had formally employed. In all the acute diseases of the pharynx and tonsils, he has abandoned the old methods—emetics, gargles, emollients, and astringents—for the antiseptic agents; and even acute coryza, which is often, as in measles and influenza, the manifestation of infectious disease, yields more rapidly to boracic lavages and irrigations than to narcotic and astringent decoctions and to aconite.

Dr. Martin's treatment of these acute catarrhal affections of the throat consists in painting the diseased surfaces three times a day with a phenic acid mixture constituted as follows:

℞ Crystallized phenic acid,
Camphor, āā 1 gramme;
Glycerin,
Distilled water, āā 50 grammes. M.

The first day, and even the first application, are marked by a notable amendment: deglutition of saliva and alimentary liquids is less painful; there is suppression of the nocturnal agitation and partial return of sleep. The next day, deglutition is still easier, the sleep good, and temperature nearly normal. The third day, notwithstanding the hypertrophy of the tonsils, which may last some time, the deglutition of solid substances is effected without difficulty; the fever is gone; there remains only a general enfeeblement, but the patient may be able in part to resume his occupation.

The dysphagia which accompanies the acute anginæ, simple or diphtheritic, is sometimes so great that it calls for the employment of nervine agents. The salicylate of sodium, and especially antipyrin, acetanilide, phenacetin, and exalgine, topical applications of cocaine (1 to 20), at meal-time, are precious auxiliaries. Patients who obstinately refuse to allow their throats to be painted with the phenic acid mixture should be required to submit to boracic acid irrigations, two litres per day of a warm four-per-cent. solution. The phenic camphor topical agent (which is a one-per-cent. solution) causes at first a momentary smarting of the diseased surfaces; this is soon followed by an anæsthetic action, with immediate improvement

in the dysphagia; and, as a general rule, the other analgesics may be dispensed with.

It is in simple erythematous angina (as might be expected) that this treatment has been most efficacious. The average duration of treatment in the mild form has been two and a half days, though naturally considerably longer in simple and pultaceous amygdalitis, while in amygdalitis, complicated with bronchitis, the affection may last a week or more.

In no case, Dr. Martin says, has he had sphacelus, suppuration, or adeno-phlegmon. Paintings with tincture of iodine, which he reserves for chronic cases, are considered by Burlureaux as the specific—at once curative and prophylactic—of phlegmonous angina. Dr. Martin has not tried iodine applications in acute cases, but he does not think them superior to phenic camphor. Moreover, it little matters what is the antiseptic employed; the principle which should always be kept in mind is that simple angina, even in its mildest form, represents an infectious state, and ought as such to receive a treatment not only expectant and antiphlogistic, but active and antiseptic.

Dr. Martin insists on the importance of prophylactic measures almost as rigorous as are indicated in diphtheria. The patient must not be allowed to expectorate on the floor, but in a spittoon, which must be thoroughly sterilized in boiling water several times a day. All swabs (which, for convenience, are made of absorbent cotton wound around a stick) are to be burned after being once used. Children and others, when the first symptoms appear, should be subjected to rigorous isolation.

These views and the resulting therapeutics are not altogether new; they are quite in keeping with the bacterial pathology of the present day, which sees in every catarrhal inflammation an infectious process. On referring to the first article in this number of the THERAPEUTIC GAZETEE, it will be seen that the savant lecturer of Cochin Hospital expresses the belief that no inflammation can originate apart from bacteria. This notion, too, is coming to be very generally held; whether future researches shall tend to confirm it or overthrow it, and whether or not the medical leaders of the day are carrying the microbe element of causation too far,—making of the microbe a kind of fetich, as some of the more conservative members of the profession think,—time will tell.

As for the treatment of the non-diphtheritic throat affections, there is, doubtless, a tendency everywhere to treat them antiseptically, and we doubt whether Dr. Martin's method, with all its parade (his paper has been published in several foreign medical journals), is a whit superior to the sprays of carbolic acid which every practitioner in this country uses. The sprays (which, with a hand-ball atomizer, may be made every two to four hours, a one- to five-per-cent. solution being used) are vastly more easy of application and are better tolerated by nervous patients than the swabbings, and the latter generally require a physician for their proper execution.

THE TREATMENT OF APPENDICITIS AND PERITYPHLITIS.

THERE is not yet a general consent to abandon the terms typhlitis and perityphlitis, denotive of inflammations in and around the cæcum, for the more modern term appendicitis, although it is true that, since the operative treatment of perityphlitis has come into vogue, surgeons who have sought for the starting-point of the inflammation have generally found it in the appendix. There certainly are pericæcal inflammations that end in resolution,—thirty per cent. of all the cases, according to Fitz,—and the presumption is that such inflammations are not suppurative, and due to perforative appendicitis. Professor Sonnenberg, of Berlin, who states this point very forcibly, has a large following, especially among the more conservative portion of the medical profession. There is a perityphlitis with sero-fibrinous exudation, presumably due to fæcal obstruction in the cæcum; these exudations are generally encapsulated, and are not apt to be followed by general peritonitis. All physicians of much experience have seen such cases. There is a large, firm, hard swelling at the beginning, which presents a marked contrast with the small exudations, circumscribed at the beginning, situated just above Poupart's ligament, which result from appendicitis. It is, of course, very important to differentiate clinically between the simple inflammatory and the purulent forms of perityphlitis, for the latter demand surgical intervention, and generally the sooner the better after the diagnosis has been made. The sero-fibrinous exudations are reabsorbed, purulent exudations originating in the appendix cannot be absorbed. In these lat-

ter cases (and here we follow Professor Sonnenberg's description) the disease has been preceded, at greater or less intervals, by attacks of colicky pains in the ileo-cæcal region. The exudation (which is circumscribed and small at the beginning) is the result of gangrene and perforation of the appendix, and is of a decidedly purulent or sero-purulent character.

Doubtless no subject more interests surgeons of the present day than that of the treatment of perityphlitic inflammations, and we need cite only the excellent work done in elucidation of the pathology and treatment of appendicitis and perityphlitis by Fitz, Homans, Bull, Elliot, McBurney, Weir, Keen, Stimson, Warren, and others in this country; by Mahomed, Treves, Dyce Duckworth, Bland Sutton, etc., in England; by Kraft, Matterstock, Maurin, Roux, Talamon, Tuffier, and many more on the continent of Europe. Among the great medical societies which have discussed the subject in all its bearings the present year, we may mention the Medical Society of the State of New York, the Massachusetts Medical Society, and the Clinical Society of London.

We cannot presume in this short article to do more than summarize some of the leading points in this mass of medical literature:

1. The mortality of the disease is great, fully fifty per cent. of those treated without surgical operation, according to Fitz.

2. In relatively mild cases, an expectant treatment only is justifiable. In the severe cases, the difficulty must always be to decide when medical treatment shall end and when surgical treatment shall begin. The more cautious men in our profession (physicians and surgeons) are, we are certain, in sympathy with the views expressed by Dr. Fitz at the Massachusetts Medical Society in June, to wait till the development of the symptoms is such as to indicate that there is either a spreading peritonitis, or such a circumscribing of the peritonitis as to make it probable that the operation will be successful. We think that it was Dr. McBurney who said at the meeting of the Medical Society of the State of New York, in February, that he had never known a patient on whom he had operated for appendicitis to recover if the peritonitis had become general. Therefore it is desirable to have some certainty that the peritonitis is really circumscribed. And when once the attending physician has made up his mind that the disease is no longer local, then he feels the impotence of drugs or other purely medical means to stay its advancing progress.

If by the tympanitic distention and tenderness in the upper part of the abdomen and on the left side (as well as on the right), by the dark-green vomitus, the increasing fever, hiccough, the anxious, pinched expression of the countenance, etc., there is reason to believe that the inflammation has overleaped the barrier of lymph whereby nature has walled in the exudation, the probability is that the barrier is already burst, and there is pus in the general abdominal cavity. Most physicians, with Fitz, would wait at least three days after the onset of the symptoms to watch the progress of the case, for the purpose of deciding whether it will recover under medical treatment or whether it will demand surgical treatment. This waiting is not only suggested by the experience in acute cases, but it is confirmed by those cases of chronic appendicitis where, after weeks of waiting, an abscess points in some region accessible to the surgical lancet, or into some internal viscus, as the colon, rectum, bladder, vagina.

On the other hand, many surgeons, like Dr. Alfred Worcester, at the Massachusetts Medical Society meeting, confident of their ability to treat these cases safely, according to the methods of modern antisepsis, and disposed from large experience to regard a laparotomy as a not necessarily hazardous operation, urge promptness in operating. Better by far operate too early rather than too late. Appendicitis, these gentlemen say, is from the first a surgical disease. They point to one great advantage in the early operation, and that is that it is easier to diagnosticate the disease in the first twenty-four hours than at any subsequent time. All the symptoms are more apparent at first. After the belly is swollen out, no man can diagnosticate the case except by abdominal section. They point to the fact that early operations are very generally successful, for reasons that are sufficiently obvious, and that in such cases the physician is not compelled to sign the death certificate of his patient as peritonitis; the patient gets well.

Dr. Worcester triumphantly refers to a record of cases operated on in the first twenty-four hours, where it was found, in some of them, that the appendix was gangrenous from the outset, and where the patients got well after a very short convalescence.

Dr. Elliot, at the same meeting, urged that perforating appendicitis was like a bullet-

wound in the intestines, and said that he nearly agreed with Dr. Worcester as to the desirability of a very early operation; but felt that the physician should be perfectly sure that his case was not one that would get well under expectancy, opiates, etc. All symptoms which indicate that a local process has begun in the region of the appendix are to be seriously considered, and almost always are a sufficient reason for operation. He would always operate in presence of a tumor; he would always operate in the presence of general distention and tympanites; he would always operate in presence of continued pain. Any violent constitutional symptoms should certainly be acted on, though constitutional symptoms are not so valuable as local symptoms.

With regard to the medical treatment of perityphlitis, there is general agreement that opiates should be given to the extent of relieving the pain, but there is not the same agreement as to the administration of cathartics. Some, as Lawson Tait, say that cathartics are the thing, and many good practitioners in this country act on the principle that the bowels should be kept open all through the disease, and for this purpose they choose castor oil (when it can be borne), and especially saline laxatives (Seidlitz powders, Epsom or Glauber salts, etc.); the results of the saline cathartic treatment certainly seem to be excellent. On the other hand, many good authorities counsel a very sparing administration of even saline laxatives, on the ground that by exciting movements of the bowels, the adhesive inflammation around the appendix and cæcum is interfered with and the protective lymph barrier broken up.

We believe that the majority of physicians, in treating this disease medically, have found that, along with a rigid opiate treatment, a moderate and judicious exhibition of mild saline laxatives (with or without purgative enemata) does not interfere with the formation of protective adhesions, and by unloading the distended bowels does good.

THE ACTION OF BROMIDE OF STRONTIUM.

IN the GAZETTE for February 16, 1891, we published an account of the continuation of Dr. Laborde's studies as to the effect of strontium and its salts on the animal organism. The most marked result determined in these experiments, which were made on dogs, was not only its entire innocuousness, but the marked diuretic action which followed the administration of the lactate or tartrate. Since then these salts have been subjected to further clinical studies, especially by Drs. Germain Sée and Féré. Dr. Sée reported his results before the meeting of the Académie de Médecine, which was held October 27, 1891 (*La Médecine Moderne*, October 29, 1891). While Dr. Sée was unable to confirm the statement of Laborde as to the diuretic properties of strontium salts, he, however, on the other hand, confirmed this author's statement as to its stimulating powers on the digestive functions. He found that the gastric disturbances common to various cardiac and renal affections were markedly improved by the administration of these salts, when given in doses of from ½ to 1 drachm, taken in divided doses in solution at meal-times. As he found that the bromide of strontium was the most soluble salt, he employed that preparation in his studies, in preference to the lactate, in thirty-two cases of dyspepsia, either with or without gastric dilatation, and in all there was marked improvement, especially as regards the evolution of gas, the strontium appearing especially to prevent acetic and lactic acid fermentations.

In six cases of nervous vomiting, no amelioration was noticed, although cannabis indica produced satisfactory results in these cases.

In dyspnœa its action appeared negative; while, on the other hand, in cases of Bright's disease it gave satisfactory results.

Dr. Sée called attention to the value of the bromide of strontium as a substitute for the potassium or sodium bromides, adding, further, that the action of the bromide of calcium is quite comparable to that of the bromide of strontium.

Dr. Charles Féré, in his studies of the bromide of strontium, paid especial attention to its action in epilepsy, his results being announced at the meeting of the Société de Biologie, held October 17, 1891 (*La Médecine Moderne*, October 22, 1891), and the meeting held October 24, 1891 (*La Tribune Médicale*, October 29, 1891).

Dr. Féré confirms the statements of Sée as to the good effects of the bromide of strontium in gastric cases, and asserts that when it is necessary to administer bromide to a patient with gastric irritability, the bromide of strontium should be preferred to all other bromides.

Dr. Féré maintains that the bromide of strontium, in its action in epilepsy, is quite

comparable to that of the bromide of potassium, even although it contains less bromine than the latter.

In reference to the statement that continuous administration of bromides predisposes to tuberculosis, he found that such statements could be confirmed in the case of the guinea-pig, where previous administration of the bromide caused those animals to succumb much sooner after inoculation with tubercle cultures than animals similarly inoculated, but in whom bromides had not been previously given.

Dr. Féré, however, states that he has never been able to note the development of phthisis in epileptics subjected to prolonged bromide treatment, but that such individuals seemed especially liable to attacks of pneumonia.

Another fact determined by Dr. Féré is that the bromides accumulate in the liver after prolonged administration, even to a greater degree than in the brain.

In his experience also bromide of strontium is a valuable substitute for the bromide of potassium in the treatment of epilepsy.

"TWENTY PENNYWORTH OF SACK AND ONLY ONE PENNYWORTH OF BREAD."

SUCH or similar language, once uttered by one of Shakespeare's characters *à propos* of the drunken Falstaff, might be the comments which some junior practitioner, sorely perplexed by difficult typhoid fever cases in private practice and anxiously looking for light, might make of a recent text-book on "Practice," * which, too much in the continental style, devotes a hundred pages to the bacteriology, pathology, symptomatology, etc., of typhoid fever, and dismisses the "treatment" by a few general considerations relative to cold baths and other antipyretic agents.

If said "junior practitioner" were desirous of carrying out the Brand system, he would, doubtless, find useful hints under the "*technique du traitement*;" he would glean little else that would be useful to him under the head of "Therapeutics." Nothing is said about the antiseptic method as taught by Professor Bouchard, and for which such brilliant results are claimed; and, as for the "accidents" or complications of the disease, such as diarrhœa, meteorism, intestinal hemorrhage, the reader is left quite in the dark as to the best method of meeting them. In this respect this treatise presents a marked contrast to the treatises of Corre and Gueneau-de-Mussy, Liebermeister, Murchison, Graves, Stokes, Hudson, J. C. Wilson, and many others that we might mention. In this French treatise we have looked in vain for any clear indications as to the administration of stimulants, and the subject of dietetics is hardly touched upon.

We think that this is a mistake in a work intended to represent the latest and most advanced science, and to furnish the practitioner all needful help in his work. Therapeutics, being the real end and aim of medical teaching, ought not to be relegated to an inferior and subordinate rank in a work intended to meet the necessities of the age; and we may say, once for all, that the curt and incomplete manner in which many of these continental authorities treat therapeutics has long been the reproach of continental medicine.

The book to which we refer is undoubtedly one of great promise, and too much cannot be said in praise of the general execution of that part which has appeared; it is, also, too true (as the writers say in their preface) "that pathology is being well-nigh revolutionized every twenty years, and that during even a less space of time a renaissance of surprising richness has transformed not only the methods but the matter even of medical teaching." Nothing, moreover, could excel in general completeness the masterly exposition of typhoid fever from the pen of Professor Chantemesse. Typhoid fever is defined as "a general disease, which expresses the reaction of the organism when invaded by the bacillus typhosus." We do not know where else can be found so full an account of the Eberth bacillus and the toxic substances which it elaborates; the results of inoculations; the relationship of this bacillus to soils, to sewerage, to drinking-waters, etc.; the modes in which it obtains access to the human body; the causes which favor its invasion; its conduct on the economy. The subject of "Pathological Anatomy" is exhaustively handled, and it would be difficult to exceed the description of symptoms; and we say again, what we have said before, that it is a pity that the subject of treatment had not been deemed of equal importance and received equal attention.

We cannot forbear advising the authors of

* "Traité de Médecine," published under the direction of Charcot, Bouchard, and Brissand, Vol. I. Paris, G. Masson, 1891. (Work to be completed in five volumes in 1893.)

this new treatise, who are writing under the auspices of such distinguished leaders, not to neglect the subject of therapeutics in future volumes,—there are four more to come; for without an adequate presentation of the treatment, these huge tomes will be by the busy practitioner, who cannot find time for anything but practical details, relegated to the department of rubbish, or kept simply for ornamental display in some little-frequented corner of his library, till twenty years come around, when, presumably, there will be another revolutionary crisis in medicine.

Reports on Therapeutic Progress.

ENDOMETRITIS.

According to the Paris correspondent of the *Lancet* (October 31, 1891) the following is the treatment of this troublesome complaint pursued by DR. LABADIE-LAGRAVE at the Paris Maternity Hospital. Starting from the idea that endometritis is most frequently of infectious origin (puerperal or gonorrhœal), he very logically applies to its cure the same therapeutic measures found appropriate in combating lymphangeitic processes occurring in any other part of the body. A person pricks his finger, lymphangeitis supervenes, with swelling of the epitrochlear and axillary glands. The local treatment found most efficacious here is free incision, with prolonged antiseptic baths. In like manner, endometritis should be met by dilatation of the os and subsequent assiduous disinfection of the cavity of the organ. The *modus operandi* of Dr. Labadie-Lagrave is as follows: The vagina is first rendered thoroughly aseptic by means of frequent douches with a 1 in 5000 sublimate solution continued for two or three days. The os is then dilated with laminaria tents, carefully asepticized. The introduction of each tent is followed by a vaginal douche and plugging of the vagina with iodoform gauze, or cotton-wool soaked in a sublimate solution. Dilatation being complete, the uterine cavity is, after having been previousiy washed out, tamponned with iodoform gauze soaked in a one-third glycerin solution of creosote. In introducing the strips of gauze, each of which should be forty centimetres long by two broad, undue downward traction on the os should be carefully avoided, as such traction might easily light up fresh inflammatory mischief. The intra-uterine dressing is renewed, at first daily, then every other day, for a period of two or three weeks, the patient being meanwhile restricted to the recumbent posture. In this way recovery is readily procured in fairly recent cases. For the efficacious treatment of chronic villous endometritis, scraping of the altered mucosa will be necessary previously to the application of the method described above.

THE TREATMENT OF CHRONIC INTESTINAL CATARRH IN CHILDREN.

1. Sixteen children, with an average age of 8 months, suffering with chronic catarrh, and already in an atrophic condition, had an average weight of three thousand four hundred and twenty-three grammes each on the day of their reception into the hospital, in which they came under the author's observation.

2. They were kept in the hospital for varying periods of time, but the average was eighty-one days, and the average gain in weight during that period was one thousand nine hundred and twenty-five grammes.

3. The daily increase in weight was from ten to fifty-six grammes; it averaged twenty-nine grammes.

4. We should never despair of the recovery of children suffering with chronic intestinal catarrh, no matter how far advanced the atrophic process is.

The treatment of this disease should be principally dietetic, but medicaments will serve as adjuncts. In children who are only a few months old and nursed exclusively at the breast of a mother or nurse, chronic intestinal catarrh will be due either to irregular and frequent nursing, or to the fact that the character of the milk is unsuited to the age of the child, or is rendered unsuitable by a recurrent menstruation, a pregnancy, or some chronic disease of the mother or nurse.

Should the intestinal disturbance be due to irregular and frequent nursing, of course, the latter must be properly regulated. If the cause lies in the milk furnished by the mother or nurse, then another nurse must be procured; not to do it would jeopardize the child's life. If the child is fed from the bottle, the physician must see that the bottle is properly cared for. If a nursing child is being also fed with rice or wheaten flour-gruel, or other substances of a similar character, they must all be removed from its diet. If the child must have something in addition to the supply from the breast, cows' or goats'

milk may be given three or four times daily in the intervals of nursing, and about three or four ounces at a time with a little sugar and lime-water mixed with it. If the evacuations are slimy or yellow and have no clots of casein, or only very small ones, bismuth may be given in 25 centigramme doses four times daily. If the stools are green and contain numerous lumps of casein, and are, moreover, accompanied by severe abdominal pain, bismuth and lime-water with a little fennel-water may be given. Or, if the trouble persists, the infusion of colombo root may be added to the bismuth, thus,—

℞ Infusi radicis colombo, 75 grammes;
Bismuthi subnitr., 3 grammes;
Syr. auran. flo., 15 grammes.
Sig.—Two coffeespoonfuls every two hours.

For children one or two years old, who have been weaned too early and have been fed on substances illy adapted to their condition, the following is suggested :

If the child is having only five or six movements in twenty-four hours, is pale, his muscles flabby, has little or no fever and considerable vitality, he may be fed with gruel made from cows' milk and pulverized rice or arrow-root. It may be given every three hours. During the night he may have a drink of cows' milk with lime-water twice. This diet must be kept up for a month. Also before each meal and at bedtime a powder should be given containing a grain or a grain and a half of quinine and two and a half grains of bismuth. If the trouble does not yield, one may add one or two coffeespoonfuls of syrup of colombo four times daily, or an infusion of the root with bismuth, as in the foregoing formula.

If, however, the diarrhœa is very severe and of long standing, the movements numbering twelve or more per day, atrophy being pronounced and fever and thirst constant; if, moreover, the child cries all the time and emaciation is rapidly advancing, only one thing can be done, and that is to use an exclusive diet of milk. The following is recommended : During the first two days two dessertspoonfuls of clear warm milk must be given every two hours. From the third day three spoonfuls must be given at the same intervals. After four days the milk may be given at longer intervals and in larger quantities. This diet must be continued three or four weeks, when the gruels may be given, this diet continuing until the intestinal catarrh is cured. If the milk diet is not satisfactory, asses' milk must be procured, and if this fails, a wet-nurse must be provided, even though the child has long been weaned. This proposition involves great difficulties, but has often been the means of saving life. In some cases in which recovery has almost taken place, it may be safe to vary the milk diet with broth from boiled or stewed meat, which may be given in dessertspoonful doses four times daily. Or one may give small portions of raw meat, in balls as large as a hazel-nut, three being given every three hours for several days. In addition to the foregoing, it is sometimes advisable to use gold, as in the following formula :

℞ Auri, .20 gramme;
Mellis, 125 grammes.
Sig.—One coffeespoonful in the morning and two in the afternoon.

Other drugs have been used, but little benefit has been derived from them. Much benefit *has* been derived, however, from the use of aromatic baths, sulphur baths, baths impregnated with chestnut leaves, and plenty of fresh country air.—*Arch. f. Kinderh.*, xiii. 1 and 2 ; *Archives of Pediatrics*, November, 1891.

THE TREATMENT OF DYSENTERY.

At the meeting of the Medical Society of London, held October 19, 1891 (*Lancet*, October 24, 1891), PROFESSOR BAHADHUDJI (of Bombay) read a paper on the "Treatment of Dysentery." Referring first to its pathological anatomy, he said that the large intestine would present one or more of the following conditions : 1, areas of congestion in cæcum and bends of colon ; 2, simple transverse abrasions at the lower end of the bowel ; 3, simple general catarrh, with thickened glands ; 4, mucous and submucous infiltration of a necrotic character, with general thickening of the bowel ; 5, areas of diffused submucous infiltration, leading to gangrene of the mucous lining ; and, 6, fulness of the portal vessels. In some very chronic cases there was a very general thinning of the gut, the colon showing marked atrophy. He compared the pathological changes in the large bowel to the catarrhal abrasions, the infiltrations and ulcerations of the mucous lining of the mouth and pharynx. In the mouth the initial irritation gave rise to a flow of saliva, and there would be a feeling of soreness about the mouth and throat. Then followed swelling, the salivary flow became less watery, there was a nasty taste in the mouth, and the

breath smelt foul. Movements of the tongue and mouth became painful, and warm drinks and spirits were not agreeable. Dirty, sticky phlegm hung to the back of the throat, and it might show streaks of blood. In dysentery the initial irritation in the large intestine led to an increased watery flow of the secretion of the alimentary canal, and, reflexly, of the liver. There was diarrhœa, which was often of biliary nature. Then the stools grew less watery, contained slime, and were fœtid. The slime came away with difficulty, causing tenesmus, and was later mixed with blood, which was greater in the case of the bowel owing to the more copious vascular supply. There was a general soreness of the abdomen, more particularly at the cæcum and at the flexures of the colon. The stools became shreddy in cases of ulcers discharging sloughs, and were offensively fœtid if there were any gangrenous destruction of the mucous membrane. As Professor Bahadhudji compared the pathology of these two affections, so he recommended that the treatment should be similar. All irritants, direct or indirect, should be avoided, such as stimulant foods and drinks, particularly meat and its extracts. He held that the indiscriminate use of meat extracts and meat juices in fever and inflammatory affections was irrational in principle and harmful in practice. It should be remembered that they were not nutritive but merely stimulant extractives, and it was the custom to give them to invalids in far too large quantities. Milk by itself, he held, was irritating; it clotted readily, and acted as a foreign body. He said that arrow-root mixed with milk was the best form of diet; it acted almost as a protective to the mucous lining. Brandy, ether, ammonia, and the like were contraindicated. The mucous lining should be helped to get rid of the mucus clinging to it, and alkalies given internally would not only loosen the mucus but check its secretion. Means should be taken to combat putrefactive decomposition by the administration of bismuth subnitrate given in small quantity. Ipecacuanha in small doses would influence the intestinal glands themselves, and tend to check secretion of unhealthy mucus. The irritation brought about by intestinal movement should be prevented by opium, which would not only check irregular peristalsis but control secretion. Should there be much weeping of the alimentary mucous membrane, with copious watery stools, vegetable astringents were indicated, such as catechu in powder and preparations of bael and pomegranate. This simple treatment, which aimed at acting on the blood, the intestinal glands, and at keeping the intestinal canal and its contents sweet, so as to enable the ulcers to take on a healthy character and heal, consisted in giving a combination of bismuth, pulv. ipecac. co. and soda, with a dietary of arrow-root and milk. It was often a good plan to give an initial dose of calomel and soda to clear away any source of irritation that might still remain in the bowel. The purely astringent treatment did not meet all the requirements of the case, and hence was uncertain in its results, and the same might be said of other empirical methods. The invariable results observed both in private and hospital practice with the above simple treatment were that the patient was first relieved of the distention, griping, tenderness and tenesmus, the quantity of blood was decreased, the stools were less offensive, though for a day or two they remained unreduced in number. About the third day the slime became less, by the fourth the blood had disappeared, there was very little slime, the stools were feculent and not foul, and the patient began to feel hungry. By the fifth day the slime had disappeared, the stools were formed and not frequent. On the fourth or fifth day the patient was allowed some extra milk and bread also, if it did not disagree. Ordinary diet was withheld for at least a week longer. Blood was generally the first sign to reappear if ordinary diet was allowed too early. He attributed the extreme prostration of the disease to reflex nervous depression, and in chronic cases to impairment of the absorption apparatus, and to the deleterious effect of the presence of decomposing gases in the alimentary canal, which gained easy access to the circulation through the open ulcers. Again, the decomposing fluids in the intestinal tract were absorbed, and might cause death from septic intoxication. Meat and its extracts, being readily decomposable, were thus particularly harmful. He did not regard dysentery as due to any specific cause or germ; it was neither contagious nor infectious. The beginning of the ulceration in dysentery arose in much the same general way as did the ulceration of the mouth or pharynx: a lowering of the system by unhealthy water and food. Malarial influences, and anything tending to an overfulness of the mesenteric veins, such as chills, a sudden change of climate, a sudden change of diet, great excess in eating, etc., would also bring it on. When whole groups of people became affected, and dysentery attacked individual

after individual, it was not because there was a specific cause, but because all those affected were exposed to the same general lowering conditions, such as privation or exhausting labor. It was a simple disease, with simple beginnings but grave endings. An ordinary wound was a simple matter, but it might cost the limb, if not the life, of an individual if putrefactive blood-poisoning were not avoided, or, if present, combated. The same obtained regarding the wounds in the alimentary canal; the irritant blood-poisoning which took place at the seat of the ulcers, and was helped in its lowering action by the loss of blood, might take the life of the patient, or, if it were less acute, it would leave him with impoverished blood and debilitated bowel.

THE TREATMENT OF ILEUS.

DR. AUFRECHT, of Magdeburg, discusses in the *Therapeutische Monatshefte* the treatment of ileus. He thinks the washing out of the stomach, recommended by Kussmaul, a valuable addition to our therapeutic resources. The first and more important indication for washing out the stomach is prominence of the organ itself when vomiting is not present or is suddenly arrested,—a circumstance which occurs in about a fifth of all the cases of ileus. He explains the sudden arrest or entire absence of vomiting, when the stomach is at the same time distended, by a slight dislocation, caused by the distended intestines, which forces the œsophagus against the margin of the foramen in the diaphragm, through which it passes. An introduction of the sound will give the best justification for such a view. The sound finds no impediment in the œsophagus, and immediately it reaches the stomach a surprisingly large quantity of liquid escapes. Dr. Aufrecht even contends that in some cases all symptoms improve by the mere introduction of the sound, and without washing out the organ. Another indication for washing out the stomach is stercoraceous vomiting. In such cases repeated washing out will remove the abnormal contents of the stomach and prevent them from doing further damage locally or by absorption. He also insists on the hypodermic administration of morphine in all cases of ileus. This treatment keeps the patient almost free from pain, which proves that peristaltic movements proceed quite normally. He is against all internal administration of opium or morphine, as their effect is not prompt when so administered, and because in the case of vomiting it is impossible to say how much of the drug has been retained. Dr. Aufrecht has also long since ceased to administer large enemata, which, in his opinion, could only be of any use during the first few days of the disease. He punctured the gut twice in the year 1873, with very unsatisfactory results: the punctured coil collapsed, but no considerable evacuation of gases took place, and one of the two succumbed from peritonitis, which appeared to have been produced by the puncture.—*Lancet*, October 24, 1891.

FREE USE OF COCAINE IN HAY-FEVER.

In the *New York Medical Journal* for October 31, 1891, DR. J. W. STICKLER cautions against the free use of cocaine in hay-fever for the following reasons:

"1. It may cause a very great, even dangerous, depression of the vital powers. Last summer a patient introduced quite a liberal quantity into his nostrils, and in a few moments he was in a condition of collapse. His physician was sent for, and, after working over him for a long time, had the pleasure of seeing him restored to a speaking condition. Subsequently a good deal of professional care was required to bring him up to anything like a normal state of health.

"2. If used freely it seriously impairs the appetite.

"3. If used late in the day or during the evening it is very apt to induce insomnia. Persons who have hay-fever do not long for any other physical disaster, at least not till they get rid of the sneezing.

"4. The free use of cocaine induces in many persons a free diaphoresis.

"5. The excessive use of cocaine often causes troublesome congestion of the nasal mucous membrane.

"6. This powerful drug prevents sneezing and allays irritation only when the membrane affected is under its anæsthetic influence, hence in bad cases it must be used almost constantly.

"7. Cocaine causes in some persons a very pleasant mental stimulation, which, while it lasts, is very delightful, but is invariably followed by mental depression and often by great irritability of temper.

"8. It often causes troublesome constipation.

"9. It does not *cure* hay-fever."

THE ENLARGED PROSTATE AND ITS OPERATIVE RELIEF.

At the meeting of the New York Academy of Medicine, held October 1, 1891 (*New York Medical Journal*, November 7, 1891), DR. E. L. KEYES read a paper on this subject. He said that to-day prostatotomy and prostatectomy were accomplished surgical facts and splendid additions to our resources in that class of grave vesical disorders found so often in the best ranks of the community late in life, in those who used their brains rather than their muscles and led sedentary lives. Yet the indications for these operations were not yet fixed. The questions on which the author asked for discussion were: 1. When was perineal prostatectomy to be preferred to the suprapubic operation? 2. What condition of prostate or vesical disease, or both, justified a radical operation, and should it be done early or late? 3. How much of the prostate should be taken away?

Prostatotomy as an adjuvant to vesical drainage had been so generally recognized as a proper concomitant of the latter operation that its consideration need not be dwelt upon, nor that new form of operation—lateral prostatectomy—performed by dissecting off the rectum from the prostate and peripherally slicing away its lateral lobes without opening either the urethra or the bladder. This operation had been suggested theoretically after cadaveric research by Dittle last year; but, aside from its manifest inability to cope with the median prostatic overgrowth, it had been tried and found wanting this year by Küster. The author then gave a detailed history of his cases, eleven in number,—three perineal and eight suprapubic. The results in the suprapubic cases had been two deaths,—one in a very promising case, the other in a very grave one. After the second case, all the remaining patients had taken diuretin freely and salol, and in none had there been any urinary fever, suppression, or pyelitis. Antiseptic irrigations and the usual precautions had been always followed. In age the patients had averaged 64. The cases had not been selected, except that all mild ones had been refused operation and no desperate case had been denied the chance, and out of these several of the patients had been so nearly dead when taken in hand that the operation had seemed more like the short horn of a dilemma than an operation of choice or expediency. Suprapubic prostatectomy in cases of this nature was of the first order in magnitude and gravity. In the author's opinion, it far outranked nephrotomy, or even nephrectomy, in gravity. Even in the milder or seemingly milder cases it was a grave resource, as every second operation demonstrated, and he thought it was not proper to attack cases early, when the symptoms were not severe, with an operation the best statistics of which yielded a mortality of 13.6 per cent., and where the well-known chances of life with the use of the catheter were so high. As to the power of restoring contractility to an atonied organ, the author's statistics lacked value on account of the recent date of several of his operations. In his eight suprapubic cases two patients had died; in three of the others, although all were up and about, the wound was not quite healed. Of the remaining three, in Case I. the operation was insufficient and the atony remained, although urination was natural and voluntary up to that point. Case II.: The patient had had eight ounces of residuum, and now emptied his bladder completely. Case III.: This patient had also entirely dispensed with the catheter and was functionally well. Whether the others would lose their atony and empty their bladders entirely without the catheter the author could not say at this time. Of the three perineal cases, two patients had emptied their bladders entirely after the operation.

An important lesson taught by the author's cases was the variety in texture of the enlarged prostate. In some instances he had found it so tough as to make it impossible of removal by the use of the curved scissors, and then digging out with the fingers. This had suggested the employment of the rongeur for this purpose, and he wished to emphasize the fact that he had found it invaluable. He then went minutely into the details of the operation as done by himself. He preferred the vertical to the transverse incision always, and in this operation, which resulted in so much hemorrhage, he thought open dressings should be used. His method was to use one or two buried sutures of catgut to attach the recti muscles, the yellow fat below the peritoneum, and the bladder wall above its incision into one firmly-knotted mass, then to carry one end of the silk loop on each side which had been supporting the bladder during the operation through the rectus muscle on either side, and again to knot it, and then tie the two loops together under considerable tension with a string passed across the sacrum. This would hold the loops between the pelvic crest and the great trochanter on

either side. This loop went in over the skin through the rectus, through the bladder, thence up over the skin on either side. The tension of the two kept the wound constantly open. Continued irrigation could then be maintained.

The author's conclusions were:

1. Prostatectomy is justifiable and does what nothing else can.

2. The perineal operation is less severe, but also decidedly less reliable, than the suprapubic; it should rarely be preferred unless there are urethral complications. In very feeble old men it may still be the operation of election.

3. The operation is not justifiable with the present statistics if the patient can be comfortable in catheter life.

4. No physical condition of the parts or of the patient short of a practically moribund state contraindicates an operation. By it in desperate cases life is often actually saved, although the operation is a grave one and its mortality high.

5. With the rongeur, better than with any other instrument, the bladder outlet can be lowered and polypoid or interstitial growths jutting into the prostatic sinus can be removed, and these points are more essential to a successful issue than the taking away of a large portion of the prostate bulk. The instrument next in value is the curved scissors; but the trained finger is the most important of all.

6. Diuretin is perhaps of value when the kidneys are deranged. It certainly does no harm.

7. Chloroform alone should be used as an anæsthetic.

THE NITRIC ACID METHOD OF DETECTING CARCINOMATOUS TISSUES.

In the course of a paper on carcinoma of the breast, read by DR. F. S. DENNIS before the American Surgical Association (*New York Medical Journal*, November 7, 1891), the author gave the details of a recently-devised method suggested by Harold J. Stiles, M.B., F.R.C.S.E., assistant to the Professor of Surgery in the University of Edinburgh. The steps of the process had been specially communicated to the author of the paper on carcinoma by Professor Cheyne, of Edinburgh, for embodiment in the paper and presentation to the Association of American Surgeons in congress at Washington. The process is given here from the manuscripts of Mr. Stiles:

1. Wash the mamma in water to remove all traces of blood. This is important, because after treatment with nitric acid the blood becomes blackened and difficult to remove, and therefore greatly obscures the appearances which the method brings out.

2. Submerge the whole organ in a five-per-cent. aqueous solution of *acidum nitricum* (B. P.) for about ten minutes,—that is to say, during the time the surgeon is clearing out the axilla.

3. Wash in plenty of running water for five minutes.

4. Place in methylated spirit (undiluted) for two or three minutes.

5. Examine the whole surface very carefully to ascertain (*a*) whether any part of the tumor is exposed upon the surface, or (*b*) whether any locally-disseminated cancer foci are exposed upon the cut surface, or (*c*) whether breast tissue is exposed.

The effect of the above-given method is to render all carcinomatous tissue and parenchyma dull and opaque white, due to coagulation of the albumen of the protoplasm of the cancer and epithelial cells. The fibrous tissue of the stroma is rendered gelatinous, translucent, and homogeneous in appearance and somewhat India-rubber-like in consistence. The fat is unaltered.

After examining the surface of the organ it should be cut into thick slices, and these are to be treated in the same way. Thus the various normal and pathological constituents of the mamma can be readily and most satisfactorily studied. Cancer and parenchyma can at once be detected if present upon the surgeon's cut surface, and, since the examination can easily be completed before the time for suturing the wound, we have in this method a means which affords the surgeon a valuable aid in ascertaining the limits of the disease and of the organ.

In two cases recently operated on by Professor Cheyne the writer was able to point out to him a speck of cancer no larger than a pin's head exposed upon the cut surface of the mamma. A corresponding point of the wound was searched, and in each case the remainder of the disease was discovered and removed.

The writer possesses microscopic preparations proving the cancerous nature of the portions so discovered. It is necessary to point out, however, that even although no locally-disseminated foci may be discovered

upon the surgeon's cut surface, the prognosis is not necessarily good, because, as we have already seen, the presence of lymphatics containing cancer cells cannot be detected with the naked eye.

In a microscopic investigation of tumors of the breast we have in the nitric acid method a means which enables us to select exactly those portions which are most likely to illustrate special points, and in this way much time and labor is saved. Those slices from which pieces are to be selected for microscopical examination must not be allowed to remain in the acid solution for more than a few minutes, as the acid renders the tissue too hard for section cutting.

PROFESSOR T. BRYANT, of England, in the course of the argument which followed the paper on carcinoma of the breast by Dr. Dennis, said that we must look upon that author's effort as a complete exposition of the whole subject. When dealing with the treatment of carcinoma of the atrophic character and comparing it with results of treatment of a more active type, it must be felt that we were considering two diseases whose histories did not differ in origin but in character. Clinically we must separate the two growths,—the slowly-growing scirrhous form and the more rapidly-growing tuberous form. He agreed entirely with Dr. Dennis as to the local origin of the cancerous tissues. There might be a predisposition for the development, but of what this consisted, whether hereditary or acquired, mattered little. It wanted no argument to prove that the successful treatment of cancer of the breast depended much upon the stage of the disease at which it was undertaken. Advanced carcinoma never could be treated with the same chance of a good result as when such treatment was begun at an early period. Then came the question of diagnosis. He wished that surgeons could always see these cases in their incipiency. A little induration in the breast was passed by and the family doctor was not consulted; then the operator nearly always had to deal with an advanced case. When the disease occurred during the active period of mammary life, the physician might be excused for assuming that the condition was one of local mastitis, but after functional activity had ceased it was safer to consider any trouble as cancer, and then it was only in the early stage that there was hope of doing good.

It was the speaker's custom, when a case of induration presented, to tell the patient that any incision would certainly cure the condition if it was not cancer, and that if it were such, operation was the one imperative procedure. He had treated upward of thirty cases of this kind, and in every one of these he had found the disease to be of a cancerous nature. In all the cases he had removed the breast, and in many he had extirpated the axillary glands. At present he had not had one case of recurrence.

Interference with the slowly-developing atrophic form of cancer simply seemed to light up the disease, and therefore it is better not to touch these true stony cancers in the aged.

TREATMENT OF HEADACHE OF GASTRIC ORIGIN.

DR. WESTPHALEN (*Berlin. Klin. Wochenschr.*, No. 37, 1891) discusses headache of gastric origin. He refers at the outset to two cases observed by him in conjunction with Dr. Moritz, and published by the latter. Although these patients did not suffer from headache, but were the subjects of obstinate intermittent fever, combined with skin eruptions resembling erythema nodosum, their cases are included in the present paper because Dr. Westphalen is of opinion that such symptoms are of gastric origin; that, in fact, toxic substances present in the stomach under certain circumstances are capable of producing, after absorption, various skin eruptions and disturbance of temperature on the one hand, and, on the other, disturbances of circulation in the central nervous system and its associated parts, a consequence of which is headache. In the two cases referred to, attention was drawn to the stomach by slight dyspeptic trouble. The conclusion having been come to that the general disturbance was due to absorption of toxic material from the stomach, an indication presented itself in the fact that, in one of the cases, there was complete absence of hydrochloric acid from the contents of the stomach. The acid was prescribed in both cases; the fever and skin eruption disappeared, and the patients completely recovered. The author explains the success of the drug on the theory that the ptomaïnes or toxines of micro-organisms are capable of exerting their detrimental influence only when there is a deficiency in the amount of free mineral acid in the stomach. The antiparasitic action of the normal gastric juice may be taken as proved in the case of certain species of bacteria at any rate. To the

two cases first reported three others are now added. In one the skin-affection present was erythema exudativum multiforme, in the other two urticaria. All were cured by hydrochloric acid. In one of the urticaria cases the outbreak was apparently prevented by this drug. The patient, who suffered regularly from urticaria, accompanied by giddiness and a feeling of congestion in the head after eating strawberries, was induced to eat a quantity of them, and to take 20 drops of dilute hydrochloric acid fifteen minutes afterwards. The symptoms failed to appear. The author next gives details of four cases of unilateral headache associated with dyspepsia and following upon errors of diet. The patients had taken many drugs, such as antipyrin, antifebrin, caffeine, phenacetin, without benefit; muriatic acid caused the headache rapidly to disappear. Further treatment consisted in the regular administration of the acid in association with mineral waters, and attention to the diet. Three of the patients recovered, while the fourth was materially benefited. In two of these cases, also, the headache was apparently prevented by the administration of the acid directly after the patient had eaten freely of some article the ingestion of which had hitherto been invariably followed by headache. While believing that in very many cases the symptoms (headache, skin eruptions, fever) may with much probability be referred to the action of some poisonous product of bacteria, Westphalen remarks that in certain cases the nature of the noxious substance is obscure, as, for example, in those in which the symptoms mentioned follow the ingestion of such articles as chocolate and strawberries. But in this last class of cases, also, muriatic acid is efficacious.—*British Medical Journal*, October 7, 1891.

CONVALLARIA MAJALIS AND CONVALLAMARIN IN THERAPEUTICS.

Dr. Manuel S. M. Bustamente has again drawn attention to the valuable therapeutic properties of convallaria majalis (*Siglo Medico*, October 4, 1891), and gives details of the successful employment of convallamarin (its active principle) in a number of cases of cardiac affections. The drug seems to be particularly of service in valvular lesions with increased venous and diminished arterial tension. The author utters a note of warning against the employment of cardiac tonics, convallamarin in particular, in cases in which the opposite conditions are present, and he describes an instance in which grave results—hæmoptysis, pulmonary embarrassment, etc.—followed from neglect of this precaution. Details are given of ten cases in which very beneficial effects resulted from the daily use of from eight to ten centigrammes of the drug. The following is a brief description of one of these cases: Patient, aged 44, with chronic pulmonary catarrh and all the symptoms of dilated heart,—increased cardiac dulness, very feeble impulse, but no murmurs. She had râles at both bases, considerable dyspnœa, and prominence of both jugulars; enlargement of the viscera, especially of the liver, with slight jaundice, and very diminished excretion of urine,—two hundred cubic centimetres in twenty-four hours. Convallamarin was given in a dose of 10 centigrammes on the first day, with the result that dyspnœa diminished, râles nearly disappeared, œdema was reduced, and urine increased in amount to one thousand cubic centimetres. Repeating the dose for eight days, a continuous improvement was noted, so that the patient could rest in comfort, the cardiac impulse became firm and regular, dulness became somewhat diminished, and cerebral symptoms (headache, semi-comatose condition), the effect probably of cerebral œdema, vanished. Urine rose in amount to eighteen hundred cubic centimetres daily. No ill effects whatever were noted. A similarly striking result is recorded in cases in which there was actual valvular lesion, with insufficiency and dilatation of the right side of the heart, venous engorgement, and general œdema, with diminished urine. The drug seemed superior in these cases even to digitalis or caffeine, the better known cardiac tonics, and sometimes gave relief when these failed.—*British Medical Journal*, October 31, 1891.

PHYSIOLOGICAL TREATMENT OF CERTAIN SKIN-AFFECTIONS.

According to the Paris correspondent of the *Lancet* (October 24, 1891), at a recent meeting of the Academy of Medicine, M. Dujardin-Beaumetz communicated certain observations of M. Semmola, of Naples, on what he termed the physiological treatment of some cutaneous affections. There exists, he pointed out, certain forms of eczema and psoriasis, which become manifest during the warm season, and disappear as soon as the cold sets in. These eruptions are determined by the irritant action of products eliminated by the skin. The general nutri-

tive exchanges being modified and the sudorific function being suppressed, the organism is, as it were, forced to rid itself of these products of incomplete oxidation by the cutaneous surface under a more concentrated form, and with a somewhat different chemical composition. In such cases it suffices to adopt a purely physiological method to bring about the cure of the eruption,—that is to say, it is necessary to re-establish the equilibrium between the activity of the organic exchanges and the depurative functions of the skin. With this object the patients are submitted to the prolonged action of baths of 30° to 35° C. during two to three hours from the commencement of September. After four weeks of this treatment, daily douches are substituted for the baths, and continued all the winter every other day. As an aid to the above treatment, M. Semmola prescribes, where there is any scrofulous taint, iodide of sodium in liberal doses, or, if there be any suspicion of gout or rheumatism, the bicarbonate and phosphate of sodium.

THE HYPODERMIC INJECTION OF CAMPHOR.

The employment of camphor hypodermically, in solution in oil, alcohol, or alcohol and ether, is much more general on the Continent than in England. German and Russian practitioners esteem it a valuable method of treating symptoms of impending collapse. Dr. Alexander, of Berlin, has published in the *Berliner Klinische Wochenschrift* a paper giving the results of an extensive series of observations made during the last two years on the effects of hypodermic injections of oleum camphoratum (composed of 1 part of camphor to 9 parts of olive oil) in a large number of cases of disease of the lungs. The dose given was 15 minims once a day. As the effects of camphor are cumulative, it was found that four daily injections were as much as could usually be borne without some unpleasant effects, such as headache and restlessness at night. After an interval of a week, however, one more injection could be given without causing any unpleasant symptoms. Phthisical patients seemed to bear continued treatment better than others, and its results in the last stage of phthisis were very valuable, the night-sweats, the irritating cough, and the expectoration being diminished in a remarkable manner, even the first dose effecting a very noticeable improvement in the patient's condition. In hæmoptysis the method also proved very useful, patients being enabled to get about again, without fear of a recurrence, more rapidly than under ordinary methods. Camphor injections administered in bronchitis increased the secretion at first, and afterwards caused it almost to disappear. They did not seem to be of much use when there was also emphysema. In pneumonia their value was especially marked in weakly individuals or in those with cardiac disease, and they cut short follicular tonsillitis and acute coryza. It was found that in some cardiac cases, where digitalis had ceased to be of benefit, after a few camphor injections, it could be again given with good results. These injections must, of course, be given to children only in very small quantities, but no effect appeared to be produced on the infants of mothers who were being treated by camphor injections for catarrhal pneumonia.—*Medical Record*, October 17, 1891.

THE REMOVAL OF FOREIGN BODIES FROM THE EAR.

Foreign bodies of many kinds get lodged in the external meatus, but in a large proportion of cases the real danger is caused by the interference of ignorant persons, and these accidents become serious, not from the mere presence of the foreign body, but by the unskilful efforts which are made to extract them. Beads, peas, stones of fruit, pebbles, shells, and pieces of slate-pencil are some of the most common substances met with in practice. Among the occasional bodies lodged in the auditory canal we must include larvæ and mature insects. Small fish have also entered the meatus during bathing.

There are cases on record in which foreign substances have been retained in the ear for many years.

The vast majority of these accidents may be brought to a successful issue by the simple use of the syringe and warm water. Fortunately, other methods are seldom necessary. The treatment should be carried out by a trained nurse, and repeated several times during the day. When difficulty occurs in young children, the surgeon ought to make an effort himself to remove the substance under an anæsthetic. An assistant should hold the head well to the side, and at the same time draw the auricle upward and backward, so as to straighten out the canal. In this way the water gets behind the foreign body, and it is soon ejected in the stream.

The Agglutinative Method.—This consists in fixing a brush or piece of wood to the impacted body by means of glue or cobbler's wax, and retaining it in position until firm adhesion has taken place. The substance can then be extracted very easily by careful traction.

Value of Instruments.—Except under special circumstances, aural surgeons are unanimous in condemning the hasty recourse to instrumental assistance. Mr. George Field says instruments are dangerous weapons, and are seldom necessary. In some cases, operations undertaken to extract foreign bodies from the external meatus have been followed by distressing results. Pieces of glass and metal have been pushed down to the bottom of the canal, and then through the membrane into the tympanum and Eustachian tube. It must, however, be admitted that cases do occur in which the substance is so firmly impacted in the meatus that extraction is impossible even by the most diligent and skilful application of the syringe. The question then arises, Shall we allow the foreign body to remain in the ear, or make a judicious effort to remove it? The decision must in every case be a matter for earnest consideration, if the substance is very firmly lodged in the external meatus, and is causing pain and tenderness, accompanied with chronic inflammatory swelling and discharge. Cases may sometimes fall into our hands in which acute inflammatory changes and tumefaction of the canal have been excited by rough and unsuccessful instrumental treatment. Under these circumstances it is certainly right to defer any interference until these symptoms have been reduced by fomentations and deodorizing and soothing remedies.

All kinds of tools have been employed to assist extraction, including single hooks, screw-hooks with little prongs attached to them, bent probes, pins, wire loops, drills, and forceps of many shapes. But the vast majority of such instruments are dangerous weapons. Occasionally a small body, such as a pea or pepper-corn, may be gently lifted up by a delicate little hook from the bottom of the meatus, and then ejected from the passage by a stream of warm water.

In the *Lancet* for October 3, 1891, Dr. John Ward Cousins describes an instrument which he has used with great success in several very urgent cases. It consists of two very delicate loops of wire fixed side by side in a metal stem, and these are so fine that when introduced along the meatal wall they readily slip over the surface of a foreign body. The loops are made in various sizes, and admit of alteration in shape, so that they can be adapted to the varying capacity of the external ear. The snare is especially useful for the extraction of hard and round substances, such as small stones, beads, and peas.

First of all, the organ should be examined in a good light to settle the question as to the presence of a foreign body in the canal. The little patient is then placed under the influence of an anæsthetic, and the auricle is firmly drawn upward and backward by an assistant. The loops are now introduced and placed in contact with the substance, and then by gentle rotation and pressure they can be readily made to slip over its surface. The sliding collar is now projected to secure it, and extraction carefully practised in the right direction. In cases of severe impaction the loops may sometimes slip, so that they have to be reapplied, and another effort performed with greater care and caution. During the extraction much hemorrhage may take place from the meatal wall, but this is of no importance, for it even facilitates the removal of the substance by reducing the tumefaction of the passage. In cases in which the foreign body is of irregular shape the fine single-wire loop, which is attached to the other end of the instrument, is of very considerable assistance. The extraction of any substance is always much assisted by filling the meatus with warm oil, and when the offending substance is lodged in the cartilaginous portion of the canal, its ejection can often be promoted by pressure with the fingers around the tragus and gentle manipulation of the auricle.

SALICYLATES IN PLEURISY.

The *Pester Medicinische Chirurgische Presse* publishes a case of serous pleuritic effusion, reported by Dr. Sigmund Déri, health officer of Kenderes, which has some especially interesting features. The effusion was absorbed by means of a remedy which had been administered for the treatment of a complication of the original disease. An agriculturist, 29 years of age, caught cold, and the next day he had a rigor and pain in the right side. Dr. Déri, having been sent for during the seventh week of the disease, found severe bronchial catarrh and an effusion into the right pleura. After a week's treatment the catarrh decreased, the fever

disappeared, and he then treated the effusion by iodides and diuretics, but without any success. An operation was being thought of, when an accident caused the treatment to be changed with unexpected success. The patient had during the twelfth week of the disease, on a mild February day, been sitting in the open air, and contracted acute rheumatism. Dr. Déri administered salicylate of sodium, which produced considerable diaphoresis, and on the fifth day of the disease all rheumatic symptoms had nearly disappeared, and on percussing the chest the respiration over the seat of the effusion was audible to a surprising degree. The patient continued the salicylate of sodium for another four days, and the effusion was completely absorbed. This case occurred in the beginning of 1885, and Dr. Déri has prescribed salicylates in several cases since with good success. Having given the history of the first case, the question was discussed by what means the same remedy acted beneficially on both diseases at the same time. Does a connection exist between the two affections, or was the complication accidental? Is the effusion absorbed by means of the diaphoretic effect of the salicylate of sodium, or does the latter act as in rheumatism? Does the drug act beneficially in the acute stage of the effusion also, or only later on? Does the treatment prevent a relapse? To answer all these questions Dr. Déri had to collect statistics, the results of which he gives. Until the year 1890 nine cases of extensive serous effusions after pleurisy were treated, but none of them presented a similar complication to the first. Therapeutically, the author comes to the conclusion that, although the salicylate of sodium acts in most cases as a powerful diaphoretic, it is not in this capacity it causes absorption of the effusion, but by some specific virtue similar to that which it exerts against rheumatism. As long as inflammatory symptoms existed—that is, in the initial stage of the disease—the salicylate of sodium had only a very trifling effect, if any; but during the third or fourth week he invariably observed its beneficial effect. Tuberculosis of the lungs and, in a higher degree, of the intestinal canal, as well as dislocation of the heart, contraindicate the administration of the drug. Debilitated patients bear even large doses well, and Dr. Déri never observed unpleasant symptoms of the heart or stomach. No case of relapse was observed. He draws the following conclusions from his observations: Chronic serous effusions into the pleura are often absorbed by the administration of salicylate of sodium. Salicylate of sodium has in pleurisy with effusion a powerfully diaphoretic and probably also a specific effect. The freedom from secondary attacks, procured by the administration of salicylate of sodium, does away with the urgency of operative interference with serous effusions into the pleura, and even relegates the consideration of such interference quite into the background.—*Lancet*, October 10, 1891.

IODIDE OF POTASSIUM IN THE TREATMENT OF DEEP WOUNDS.

Dr. Schleich has administered iodide of potassium in ninety-two cases of wounds of considerable extent or depth affecting both the bones and the soft parts, including operation cases. The progress of each wound was noted for several days before administering the iodide of potassium, as well as during the period of its administration and for a few days afterwards. The cases were mostly those where the granulation process was slow, but during the administration of iodide of potassium in 5½ grain doses three times a day, the surface of wounds, which had been smooth, of a dirty gray color, and partially covered with fibrin, changed in four days to a healthy red color, appearing granular and vascular; the circulation improved, and the secretion, which had previously been very scanty, increased. In other cases, which had all along presented plenty of granulation tissue, the time occupied in the healing of the wound appeared to be shortened by the drug. When the doses were considerably increased, the secretion became profuse and the granulations excessive, very spongy, and wanting in vascularity. He concludes from his observations that iodide of potassium possesses the property of increasing the activity of leucocytes in places where the circulation has been disturbed by wounds. In this manner may also, perhaps, be explained the absorption of effusions and the disappearance of such new formations as gummata, which are apt to be affected by fatty degeneration.—*Lancet*, October 10, 1891.

COLD SITZBATH AFTER CHILDBIRTH.

According to the Berlin correspondent of the *Medical Press and Circular* for October 14, 1891, Dr. G. Pingler has recently put forth a powerful plea for the routine employ-

ment of the cold sitzbath immediately after the expulsion of the fœtus. He first commenced this method of treatment in 1850, and, after twenty-seven years' experience of it, felt himself justified, in 1877, in strongly recommending it, which he did in a pamphlet then published under the title "The Use of Tempered and Cold Water in Pregnant, Laboring, and Lying-in Women" ("Anwendung des temperirten und kalten Wassers bei Schwangeren, Kreisenden und Wöchnerinnen"). The pamphlet did not meet with a warm reception, so after the lapse of another sixteen years he comes up to the attack once more. He recommends that every woman, immediately on the expulsion of the fœtus, shall be put into a sitzbath of a temperature of 8° to 10° R. (50° to 54° F.), that the sacrum and lower abdomen shall be vigorously bathed in the water, and the upper part of the abdomen and loins well douched with water of the same temperature. Every physician, he says, even unacquainted with hydrotherapeutics, will readily understand that this proceeding is one of great importance, and he would add that no procedure as taught by the schools, however energetically applied, can be compared with it, either as regards rapidity of action, or duration, or thoroughness. In at most five minutes the whole genital sphere has its vitality heightened to the highest degree, not for the moment, but in diminishing ratio for days together. Then follows the question, Are the life and health of the woman endangered in any way by this procedure? After long and extensive observation, he is quite convinced that by means of it hemorrhages are prevented, the manual separation of the adherent placenta is rendered unnecessary, and anæmia and septicæmia may constantly be avoided. He requires, however, before making use of the bath, that the patient shall have a bed capable of insuring the necessary reaction, and that, above all, she shall not be lying on straw; further, that the midwife or other person shall without much disturbance see to the establishment of the reaction. For this purpose the hand is to be introduced carefully beneath the clothes, and the hips and thighs and legs well rubbed. If two persons are present, five to ten minutes are generally sufficient for the establishment of the reaction. If this is well established within from ten to thirty minutes, there need not be the least fear that the patient will suffer from the effects of the bath, especially if care be taken that the surface warmth of the patient is equable. But the practical physician is not to be won over by theoretical considerations only; he, therefore, goes on to show the practical results of this apparently heroic treatment. Two midwives in Königstein always used the cold sitzbath in this way. One of them had attended thirteen hundred confinements without a single death. Another had attended seven hundred without a single death, although turning and perforation had been called for. He can vouch also for the fact that the autochthonai of Königstein have not the slightest fear themselves of the sitzbath; the immigrants, however, have; these also are, however, arriving at more enlightened notions. Not only the midwives of Königstein, but those of the surrounding neighborhood, are making use of the sitzbath, and when Dr. Pingler, the author, became chief of the medical district of Königstein, he not only enjoined the use of the sitzbath upon the midwives, but threatened them with punishment if they allowed any patient to die of hemorrhage without having made use of it. At each yearly inspection of midwives he satisfied himself that no death had occurred, not even after abortion. All the midwives declared that the sitzbath had a tremendous influence over uterine contractions. He has obtained the results of two thousand four hundred cases, all of which were favorable, and he asks the question if there is any other new form of treatment the action of which has been so thoroughly tested?

Dr. Fresenius, of Soden, who has also tried it, speaks in most favorable terms of the sitzbath. He says, "I have tried it in a practice extending over years, and make use of it on account of its prompt and permanent action in cases of atony of the uterus. The considerable difference between the temperature of the body and that of the water acting reflexly, immediately sets up powerful uterine contractions that stop the hemorrhage. If the placenta is still in the uterus, a little massage of the fundus, and gentle contraction on the cord, suffice generally for the removal of it. If the contraction is permanent, the patient is placed on a linen sheet over woollen blankets, wrapped in them, and rubbed dry, and after removal of the sheet, wrapped up warmly in bed."

Post-partum hemorrhages, or diseases of the genital passages, have never been observed after this procedure, and as it does not last longer than a minute, the cold vaginal irrigations and other cold applications are unnecessary. Dr. Thewall, another pl

cian practising in Königstein, also bears testimony to the safety and effectiveness of the sitzbath. Instead of patients becoming more exhausted by the bath, it is refreshing and invigorating, and they often remark that they feel as if they had not been confined at all. It was first of all in the treatment of hemorrhage that Dr. Pingler used the cold bath, then for expulsion of the placenta; he then went on to make use of it for anæmic and weakly women as a prophylactic, and, finally, he directed all the midwives of the town never to omit it in any case, and so the matter stands at present.

In cases where the sitzbath cannot be given, the patient is made to sit on a narrow board over a large vessel, and the loins and abdomen are well douched until the uterus contracts. Both the midwives of the place were once confined at the same hour. Both made use of the sitzbath, and both were at work again on the fifth day after labor. Without going so far as to recommend the adoption of Dr. Pingler's method of treatment in all cases, and under all circumstances, we think he has made out his case, so far as the occasional employment of the sitzbath is concerned. Many women would be horrified at the thought of a cold bath at such a time, and the general practitioner would not exhibit much tact who insisted upon putting a new method of treatment into practice totally regardless of the feelings or prejudices of his patient.

THE TREATMENT OF WHOOPING-COUGH WITH OUABAÏN.

Over a year ago Dr. Gemmell reported his experience with the glucoside ouabaïn in the treatment of whooping cough.

This glucoside has a formula of $C_{30}H_{46}O_{12}$, and is obtained by crystallization from a watery extract of the roots of the ouabaïo, a plant nearly related to the *Carissa Schimperi*. Like strophanthus, the juice of the plant is used as an arrow-poison by the Somalis of East Africa.

Prior to Dr. Gemmell's paper, Dr. Percy Wilde had recommended a trial of it in asthma and whooping-cough, probably from having read of the experiments of two Paris physicians, Professor Gley and Professor Arnoud.

Those gentlemen found that the $\frac{1}{2000}$ grain caused death to a frog by arresting the heart's action. In a dog, $\frac{1}{175}$ grain markedly slowed the respiration without much cardiac disturbance; $\frac{1}{280}$ grain first stimulated, then slowed, respiration, till it ultimately ceased completely.

Hypodermically, it is more powerful than when given by the stomach; $\frac{1}{65}$ grain so introduced is fatal to a man. From the experiments of Dr. Gemmell, the standard dose for a child under 5 years is $\frac{1}{1000}$ grain every three hours in solution. This dose usually lessened the number of coughs and whoops. In two cases, however, where the children were much prostrated by the violence of the cough, $\frac{1}{500}$ grain, and latterly $\frac{1}{250}$ grain, was given every three hours. This is equal to about $\frac{1}{12}$ grain daily, which is nearly double the strength of the dose advocated by Professor Gley, who estimates the maximum daily dose for an adult as 1 milligramme ($\frac{1}{65}$ grain).

Dr. Gemmell, up to the time of writing his article, had treated forty-nine cases; twenty-five patients had been dismissed cured, and four had died (one from diphtheria, one from tubercular meningitis, one from capillary bronchitis, and one from gradual progressive emaciation). The remainder were still under treatment when he wrote. In no case did he notice any ill effects of the drug.

From accurate observation, Dr. Gemmell concludes that ouabaïn is of marked benefit in all stages of the disease. In the first stage, it cuts short the attack; in the second stage, it reduces the violence and frequency of the cough, and diminishes the number of whoops; and, in the third stage, it hastens convalescence.

It is interesting to note how little of the alkaloid in each case was required. In one case the whoops ceased after $\frac{1}{4}$ grain had been given. The time during which this was given was six days.

In another case, which was accompanied by severe vomiting and bleeding, $\frac{3}{10}$ grain was required, given at intervals of four hours for fifteen days.

In the *New York Medical Journal* for September 25, 1891, DR. I. LINDSAY PORTEOUS reports three cases of whooping-cough, two of which occurred in children and one in an adult, in which marked improvement was almost immediately observed after the administration of this drug. To a child of 15 months of age, Dr. Porteous gave $\frac{1}{4000}$ grain in solution every three hours. On the following day the child had only two whoops and less coughing, and at the end of a week was apparently entirely well.

For a child of 4 years of age, he ordered $\frac{1}{1000}$ grain every four hours, and here also cure was noted at the end of a week.

To the adult, a woman of 45 years of age, he ordered $\frac{1}{100}$ grain every three hours, and here also rapid cure is claimed to have taken place.

Dr. Porteous maintains that the action of ouabaïn is evidently not cumulative. During the administration the pulse, temperature, and respiration are slightly lower.

It promotes the action of the skin after three or four days' treatment. The bowels act regularly, and the usual accompanying diarrhœa of whooping-cough is not, as a rule, present during the treatment.

It, like strophanthus, increases the flow of urine.

The appetite in all the cases was increased. Dr. Gemmell likewise noticed this. The toxic effects are considerable slowing of the pulse and respiration, and the latter is the one to be particularly on guard against.

GENERAL VERSUS LOCAL TREATMENT OF CATARRHAL INFLAMMATIONS OF THE UPPER AIR-TRACTS.

At the recent meeting of the American Climatological Association, Dr. Beverley Robinson read a paper on this subject (*Sanitarian*, October, 1891).

The author deprecated the tendency towards indiscriminate operative interference in cases of nasal obstruction *per se*. The nasal passages are unequal in so large a majority of individuals as to constitute almost a normal condition. If such obstruction from deviation of septum, etc., can be demonstrated to be a cause of disease, then it should be removed, of course. He did not believe, however, that nasal obstruction was so frequent a cause of disease of the nasal lining membrane, or of the ears, eyes, and tonsils, as had been claimed. Warm medicated inhalations are serviceable in catarrhal inflammation of this region, but require added caution, as there is increased susceptibility upon exposure after using them. The nasal douche is often a two-edged sword, with ear-trouble as a frequent sequence. A close and clear relation can often be demonstrated clinically between the general constitutional state and local disease of the catarrhal type in the upper air-tracts. The author had seen many cases of nasal catarrh remain obstinately unaffected by local treatment, the condition disappearing, however, promptly upon the relief of a coincident and related gastric catarrh or torpid, inactive liver. Hypertrophy of the nasal mucous membrane often coexisted with gastric catarrh of the chronic type, which latter must be relieved before the tonsillar troubles will disappear, in many instances. Treatment by galvano cautery often relieves, obviating the necessity for surgical removal. Cauterization is innocuous except in certain conditions of catarrhal inflammation of the nasal mucous membrane, characterized by great dryness and irritability, the formation of scabs and crusts, and a tendency to bleed easily. Carbolized vaseline, or, better, Goulard's cerate freshly prepared, afforded great relief in this class of cases. He did not use as often as formerly the saturated solution of sulphate of copper, once a favorite application in such cases. The association and evident inter-relation of catarrhal affections of the upper air-tracts with the rheumatic and gouty diathesis had been frequently observed by the writer. Such patients were not benefited by exclusively local treatment. A sojourn at some appropriate resort, with the free exhibition of alkaline and antirheumatic mineral-spring waters would effect a cure. Enlargement of the lingual tonsil, a frequent cause of a most obstinate cough, which had been variously termed hysterical, anæmic, or nervous, often depended upon a rheumatic or lithæmic diathesis. He had seen it relieved by outbreaks of overt rheumatism. The mechanism of action involved in the production of this cough by enlargement of the lingual tonsil was through an irritation from pressure upon the epiglottis. Cautery would, at times, relieve this condition, but not always. Carbolic acid and glycerin applications are also effective in some instances. Globus hystericus is quite often due to the same cause,—enlarged lingual tonsil. With regard to chronic laryngitis, he did not believe, with Bosworth, that chronic laryngitis was always a secondary condition, and due to obstruction or other nasal disease. Therefore treatment should not necessarily be directed to the nasal cavities for the relief of chronic laryngitis.

In hay-fever he considered local applications of rather more value than change of residence. A perverted condition of the peripheral nerves is responsible for many of the symptoms. Cauterization of this hypersensitive surface was often of great service. He was not prepared to express a final o[illegible]

ion as to the value of the ice-bag treatment, but had seen it render excellent service.

Finally, as regards the important question made necessary at times by expediency or financial considerations, "Shall the subject of catarrhal inflammations of the upper air-tracts be treated by the specialists or the family physician?" he assumed the position that the best interests of the patient are subserved by a broad view of the subject, much more likely to be taken by the general than the special practitioner; a position corollary to the demonstration of an intimate relation between the local symptoms and causative constitutional states of disease.

THE ANATOMICAL CHANGES OF CURED PHTHISIS.

At a recent meeting of the New York Pathological Society, DR. H. P. LOOMIS presented the lungs from four cases to illustrate these changes (*Medical Record*, October 10, 1891).

The frequent presence of these lesions in post-mortem examinations gave ground for the belief that many more persons recover from tuberculosis than would appear from clinical observations. Out of five hundred and twenty-four autopsies at Bellevue Hospital on persons dying of non-tubercular diseases, forty-three, or eight per cent., presented in the lungs the changes which he considered characteristic of healed tuberculosis. Dr. Austin Flint had stated that out of six hundred and forty cases of phthisis, forty-three, or 6.5 per cent., recovered; and Dr. Williams, of London, reported that out of one thousand cases, 4.6 per cent. were cured. The question of the existence of tubercle bacilli in these apparently healed areas could only be satisfactorily demonstrated by inocular experiments, and in the few experiments of this kind which he had made, these bacilli were not found.

The first specimen showed at the apex of the right lung a dense, circumscribed, circular nodule, three-quarters of an inch in diameter, surrounded by laminated fibrous deposits, and presenting the appearance of a solid cicatrix formed of cartilage. The nodule was situated in the substance of the upper lobe, but connected with the puckered and depressed pleura by easily recognized bands of new connective tissue. The lungs were normal.

In the second specimen, contracted and disintegrated areas were scattered throughout the upper lobe, in which no remnant of pulmonary tissue could be found. The remaining portions of the lungs were normal. Broad white septa of dense fibrous tissue traversed this upper lobe in every direction, the bronchi were dilated and their walls enormously thickened, and a small contracted cavity with walls one-eighth of an inch thick was found near the apex.

The third specimen showed a healed cavity two inches in diameter in the upper lobe. It was closed in on all sides, and lined by a dense fibro-cartilaginous false membrane, which, in places, was one-quarter of an inch in thickness. No bronchus could be found opening into the cavity. The walls were trabeculated, and vegetations projected from them, while in the most dependent portions of the cavity, some grumous, cheesy material had collected. The surrounding pulmonary tissue was indurated and infiltrated with black pigment, but the other portions of both lungs were normal.

In the fourth specimen, the upper lobe, which was normal in other respects, presented a cavity one and a half inches in diameter, having perfectly smooth walls. There was but little connective tissue surrounding this, and a microscopical examination revealed the interesting fact that the cavity was lined with ciliated epithelium, and that it was, therefore, a dilated bronchus, and not the result of tubercular destruction of tissue. Dr. Loomis said that this was only the second specimen of the kind which he had seen.

The PRESIDENT said there was no question about these specimens being tubercular, and he believed with Dr. Loomis that they were of very frequent occurrence, but he would place the percentage considerably higher; for in at least twenty per cent. of the cases dying from non-tubercular disease in the charity hospitals of this city, he found these old cheesy, calcareous nodules in the upper lobes of the lungs.

DR. T. M. PRUDDEN also thought these lesions were very frequently met with. Their exact significance could be best determined by a comparison of such post-mortem statistics with accurate clinical records. He thought it was hardly desirable to speak of all such lesions as those of "cured phthisis," for cases in which living tubercle bacilli were found would be more accurately described by calling them cases of tuberculosis in abeyance.

Reviews.

THE INTERNATIONAL MEDICAL ANNUAL AND PRACTITIONER'S INDEX; A WORK OF REFERENCE FOR MEDICAL PRACTITIONERS. 1891. Ninth year.
New York: E. B. Treat, 5 Cooper Union.
Chicago: 1991 Clark Street. Price, $2.75.

This very useful book appears for 1891 in the same shape as in 1890. As before, we feel convinced that its size and general appearance are by no means as attractive as before the latter year. Its contents, however, are just as valuable, even though the book is less convenient in size. The list of its contributors varies somewhat from last year, but the standard of excellency is maintained. As before, it is indexed in two sections,—new treatment and new remedies.

As we open the book we find "Hypnotism and Therapeutic Suggestion," by A. A. Liébeault, M.D., Nancy. The name of the author is sufficient warrant for the value of the article, which is very full yet very brief. Dr. Liébeault, while acknowledging that he has adopted a "method well known to magnetizers," adds to it not only verbal suggestion, long ago used by Favia to induce sleep, but something more. He hypnotizes one in the presence of many more patients, so that each, waiting his turn, may become familiar with the method, and by thus arousing the imitative faculty and allaying nervousness, he claims greater certainty and greater numerical success. Over nine-tenths of his efforts are successful.

Dr. Liébeault's article is followed by a note on the same subject by Dr. Charles Lloyd Tuckey, whose name is also so closely associated with the British investigation of hypnotism.

The first article on "Phthisis" is by R. Shingleton Smith, M.D., and covers the creosote, balsam of Peru, guaiacol and iodoform, aristol, salol, and the hot- or cold-air treatment. The method of Koch—just rumored at the time of publication—is, perhaps, as well unnoticed.

The second article on "Phthisis" is by Dr. F. de Havilland Hall, and deals with intralaryngeal injections. Dr. R. Shingleton Smith gives also a very valuable paper of ten pages on the "Climatic Treatment of Phthisis."

Dr. F. de Havilland Hall is also author of the article on "Pneumonia," which is of unusual interest and value,—interest as showing the diverse methods of different men in dealing with the same disease; and of value, we hope, because to us the treatment of pneumonia badly needs some further elucidation. The author says, "Dr. H. C. Wood argues powerfully for the use of veratrum viride," and quotes extensively Dr. Wood's argument.

Of new remedies, we find few which were unnoticed in the previous "Annual;" of new uses for old, even year-old, remedies, the "Annual" gives us many useful pages, and we can recommend it as cordially this year as ever before. E. W. W.

MODERN MATERIA MEDICA FOR PHARMACISTS, MEDICAL MEN, AND STUDENTS. By H. Helbing, F.C.S. 1891. Second edition, enlarged.
Published at offices of the *British and Colonial Druggist*, 21 New Bridge Street, London E. C.

This is the kind of book that one needs nowadays to have at hand. To show its method, let us take its first page. Acetanilide: first its synonymes,—antifebrin, phenylacetamide; then its chemical formula, method of preparation, with the formulæ of reactions, physical and chemical properties, medicinal uses, and a notice of its derivatives,—asepsin, antinervine, salbromalide, and antikamnia. There are no old remedies in the book. All its space is devoted to the recent ones, and we have appended tables on average doses, solubility of new remedies in water and spirit, and melting- and boiling-point of new remedies in Centigrade degrees. The book contains one hundred and fifteen pages, and can easily be carried in the pocket.

E. W. W.

SYLLABUS OF THE OBSTETRICAL LECTURES IN THE MEDICAL DEPARTMENT OF THE UNIVERSITY OF PENNSYLVANIA. By Richard C. Norris, A.M., M.D., Demonstrator of Obstetrics, University of Pennsylvania, etc. Second edition.
Philadelphia: W. B. Saunders, 1891.

This syllabus is designed to meet the difficulty of accurate note-taking. It is interleaved, and is of no special use to others than medical students, unless, perhaps, the antiquated practitioner might like to know his own deficiencies, when a perusal of the book would speedily tell him where he stands or lies, and what strides even obstetrical science has made since the far-off days when he listened to the early lights now gone out. But though only designed for a limited class, Dr. Norris has performed his work with conscientious thoroughness and good sense, covering the whole field of obstetrics. The interleaving of the book makes it doubly useful.

E. W. W.

PRACTICAL SURGERY. By William Johnson Walsham, F.R.C.S. Third edition, revised and enlarged. Philadelphia: P. Blakiston, Son & Co., 1891.

The first edition of the above work was issued as one of the "Student's Guide Series," and had for its object the purpose of aiding the beginner in gaining a general insight into the theory and practice of surgery. It was in no way the intention of the author to supplant the larger and more complete text-books upon this subject; but, as he very justly remarks, their size has grown to such a magnitude that it takes months even to read them; therefore, as an introduction to the study, and an aid in the practical application of knowledge, the work was written. The success of this object may be judged by the fact that the book in a very few years has reached its third edition. Evidently such a demand indicates that the author has well done his task.

The present edition has been revised and much new matter added, so that the work gives a fair outline of modern surgery and the methods of surgical treatment. The additions are more especially to be found in the Section on General Pathology, and particularly that part which treats of inflammation. While admitting other causes for inflammation, micro-organisms "are also believed to play an important *rôle* in the causation of inflammation." The termination of the inflammatory process in suppuration is said to be due to the presence of micro-organisms and the long-continued action of an irritant. Tubercle is described as a new formation, which depends upon the presence of the tubercle bacillus. The book is evidently modern and progressive, and as an introduction to the study of surgery it will be found valuable. J. H. C. S.

ESSENTIALS OF BACTERIOLOGY. By M. V. Ball, M.D. Philadelphia: W. B. Saunders, 1891. Price, $1.00.

The author has accomplished his object, and given us a book which is both concise and practical, which is adapted for students and for the laboratory. A work evidently written from experience in the working laboratory, giving to the beginner the information he so much needs. The difficulties which are met with in the practical study of bacteriology are many, and it is for this reason that many neglect to acquire sufficient knowledge of the subject to utilize this most important means of diagnosis. Every year the field is enlarging, and in order to keep abreast of the period, in order to avoid being left to grope in the darkness of ignorance, the study of bacteriology must be undertaken; its difficulties must be overcome, and it is with such works as the above that one will have to make the beginning. After all, it will be found that the most difficult part is the beginning, but we believe any one with the necessary preliminary instruction which the study of histology and pathology has given him, by carefully following out the directions to be found in Dr. Ball's book, can successfully enter upon the study of bacteriology, which may further be investigated by a study of the more elaborate treatises on the subject.

J. H. C. S.

STUDIES IN PATHOLOGICAL ANATOMY. By Francis Delafield, M.D., LL.D. Vol. II., Part IV. New York: Wm. Wood & Co., 1891. Price, $5.00.

This number of Professor Delafield's "Studies in Pathological Anatomy" gives us a pictorial history of chronic Bright's disease. There are fifty plates, which, with the twenty and more pages of text, make a most complete treatise of the subject. Indeed, with these most excellent micro-photographs, and the accompanying clinical histories of the cases from which they were taken, one has a means of studying the pathological changes that occur during this disease in a manner so satisfactory that the time-absorbing process of preparing specimens for microscopic study may be dispensed with. And further, for the student of pathological histology, such photographs of the pathological changes, taken from typical cases, are of invaluable assistance in aiding him in his studies. J. H. C. S.

THE PRACTITIONER'S VADE-MECUM: A PRACTICAL WORK ON NEW MATERIA MEDICA, MODERN THERAPEUTICS (PHYSIOLOGICAL, MEDICAL, AND CLINICAL), AND RECENT TREATMENT OF DISEASES MET WITH IN ALL BRANCHES OF MEDICAL PRACTICE, INCLUDING VARIOUS OTHER SUBJECTS CONNECTED WITH THE PRACTICE OF MEDICINE. By Edaljee Cawasjee Appu (Tukina), L. M. and S. First edition. Bombay: Printed at the Imperial Press, Kalkadevi Road, 1891. (All rights reserved.)

This book, the preface of which was signed in Bombay in July of the present year, is dedicated to the late lamented Jamsetjee Nesserwanjee Petit, Esq., J.P., and is a remarkable evidence of the way in which the English language and the European civilization are spreading over the whole world. It is composed of three parts, making altogether a volume of nearly fourteen hundred pages, containing, on the whole, a fair statement of

most of our practical knowledge of therapeutics. Its English is a little foreign; occasionally a word is used in an improper sense, but the style is clear, direct, and, considering that the author is a native of a race having a language differing in its root-stock from English, the linguistic performance is remarkable. That it should be written in English for the natives of India indicates a wider and more complete knowledge of the language by the people of that land than we suppose most Americans would have expected. Very many of the newest compounds are noted in the book. "Thiocamph," "Thionaphthol," "Tribromophenol," "Ural," "Morrhuol," "Nitrate of Muscarine," are headings of separate articles hardly to be found in our ordinary therapeutic books. Some of the statements concerning these new substances are evidently based upon excessive credulity on the part of the author in regard to the assertions of Western physicians. Thus, we read that "morrhuol is the curative active principle of cod liver oil, powerfully increasing the appetite, and a most potent diaphoretic and diuretic;" all of which is probably false. Some things are a little hard to understand,—that is, that a very certain sign of the moribund condition "is the suppression of the catamenia as a diversion in favor of the acknowledged vital functions. This may occur months before the catastrophe arrives." Optic delusions are also given as important death-signs; also "left unilateral dropsy beginning in the foot is a sign of approaching end, and with this is conjoined coolness of the ears, tip of the nose and malar regions, to be followed much later by coldness of the patellar surface." Prowling through the book, we find various things which we would like to know whether they are true or not. For instance: "There is something remarkably singular and unaccountable regarding the action of the elaterin in producing such a great flow of serum, and causing it to *coagulate in the vagina*. We believe it is the only drug which has this power." Some things smack very strongly of the Indian soil; as, for instance, "Oxalic acid gravel, or *poor man's* gravel, is due to exclusive vegetable diet."

The final judgment to be made on a book like this, of course, varies with the standard by which it is judged. It does not compare favorably with the best efforts of European or American book-making; it does show wide knowledge, and indicates a good deal of practical medical skill; and it is very remarkable as having been written by a native of India. English, Russian, American, German, and writers of other nationalities are quoted, probably some of them at second-hand.

We congratulate Dr. Appu, and trust that his own countrymen will come to regard his work as what he claims it to be,—namely, "an invaluable guide for ready reference and practical use."

THE COMPARATIVE ANATOMY OF THE DOMESTICATED ANIMALS. By A. Chauveau, M.D., LL.D. Revised and enlarged with the co-operation of S. Arloing. Second English edition translated and edited by George Fleming, C.B., LL.D., F.R.C.V.S. With five hundred and eighty-five illustrations.
New York: D. Appleton & Co., 1891.

When "Chauveau's Anatomy" first appeared in its English dress seventeen years ago it at once assumed the position towards veterinary students that "Gray's Anatomy" has held for so many years for students of human anatomy; but, unlike the latter, the English translation of "Chauveau's Anatomy" has not been kept abreast of the times, though four editions have appeared in the French language since it was first translated. Though this neglect has led to the appearance of many rivals, "Chauveau's Anatomy," as it now stands, is easily first, as it is, in fact, indispensable. The reputation of its author and editor is sufficient to prove that this work is all that it claims to be, and it may now continue to be accepted as in every way worthy of the position accorded to it as the best on the subject.

A TREATISE ON PRACTICAL ANATOMY. By Henry C. Boenning, M.D.
Philadelphia and London: F. A. Davis, 1891.

It is with much gratification that we notice there has been during the past few years quite an impetus given to the study of anatomy,—that is, if one may draw conclusions from the number of works which have been published on this subject. In Philadelphia alone we have had issued from the press the works of Allen, Nancrede, Young, and McClellan, also recent editions of the classical works of Gray and of Leidy, and to day we have for our notice the above work of Dr. Boenning.

Of all the divisions of the study of medicine, that of anatomy may be considered more especially a study which has for its acquirement the cultivation of the memory. There are few or no theories to be decided; there are no hypotheses to puzzle, and there are few conflicting opinions to reconcile. It is a study of facts which are to be memori-

and it is the presenting of these facts in a brief and easily-remembered manner that makes the successful book. As an evidence of the truth of this statement, we need only mention the work by Gray.

Our author, it may be said, has given us the facts of anatomy, as they are understood and taught at the present day, in a concise and readily comprehensible way. More especially is this noticeable in the sections which treat of the joints and of the muscles; indeed, the entire context of the book is highly creditable to its author. We regret we are not able to say the same of the illustrations, many of which are not good, and a few are positively bad. J. H. C. S.

A MANUAL OF PRACTICAL OBSTETRICS. By Edward P. Davis, A.M., M.D., Clinical Lecturer on Obstetrics at Jefferson Medical College, etc. With one hundred and forty illustrations, two of which are colored. Philadelphia: P. Blakiston, Son & Co., 1012 Walnut Street, 1891.

This work seems to us to fill a much-felt want,—that of a small but good work on obstetrics, well illustrated, and containing all that the student is likely to need. The illustrations are all good, large, and complete. The text is plain and yet full enough, and the whole book is very satisfactory. It is not a primer, or a compendium exactly, but a small obstetric text-book, complete as most other works, with the padding left out. It does not tell us anything about antediluvian births, or archaic forceps, nor all the errors of the past about generation, conception, and the ovum. The student and practitioner can get as much out of it as out of the most elaborate works in many volumes for most of his needs, and the encyclopædic works he can purchase later. E. W. W.

Correspondence.

LONDON.

(From our Special Correspondent.)

A very simple and physiological method of obtaining blood suitable for purposes of transfusion has just been worked out by Dr. Wright at the laboratories of the Colleges of Physicians and Surgeons. It depends on the principle, already known, that blood when decalcified loses its coagulating power (regaining it, however, on the re-addition of calcium salts). Dr. Wright withdraws blood direct from a vessel, and allows it to flow into a beaker containing a solution of potassium oxalate. The lime salts are thus precipitated in the form of insoluble oxalates. It is found that the presence of one-tenth of one per cent. of potassium oxalate is sufficient to prevent coagulation in dog's blood, double that amount being required in ox blood. The method has been tested on dogs by withdrawing successive portions of their blood into potassium oxalate solution, keeping those which show no signs of coagulation, and then bleeding the animals nearly to death. Injection into their vessels of the decalcified blood is then made, and is said to be a perfectly efficient method of restoring the animals. I am not aware whether Dr. Wright has determined the effect of the transfused blood on the remaining corpuscles, but however this may be, this decalcified blood should possess great advantages over both simple saline solution and defibrinated blood, which latter, from the fibrin-ferment contained in it, is apt to set up intravascular coagulation.

The theatre of the Examination Hall of the Royal Colleges of Physicians and Surgeons has been the scene of many interesting orations, but none have been more valuable than the course now being delivered there by Dr. Burdon Sanderson, the Croonian lecturer for the year. This year the theme is the "Progress of Discovery relating to the Origin and Nature of Infectious Diseases," and at no time have we felt more the need for a summary of this kind. These lectures are, however, something more than a mere summary, for all through we see the immense amount of individuality thrown into them by the orator, than whom nobody could have been found more qualified both by his scientific reputation and by his own vast researches to give a reliable opinion on this most difficult subject. The course consists of four lectures, but the subject more naturally divides itself under three heads, so that Dr. Sanderson has devoted the first three lectures to two subjects,—namely, 1, the causes of acute diseases and their mode of operation; 2, the reaction of the organism against the operation of morbific agents. The last lecture will be devoted to "Specificity, or the Relation between the Distinctive Characters of Specific Diseases and those of the Specific Causes which Produce them." At the time of writing I can give an account only of the first two, but I hope, before closing, to be able to give also a brief account of the third lecture.

In commencing his subject, the lecturer traced, first, the origin and development of the doctrine of the infective nature of inflammation, this being the pivot on which pathological doctrines on other subjects have always turned. Commencing with the old idea that whenever inflammation occurs after injury, whether mechanical or chemical, the *apparent* cause is the real one, he traced the gradual acquisition of the facts which overthrow this doctrine. We now know, of course, that the old dictum is not in the majority of cases true, and that, however direct may be the relation between damage done and the reaction which follows, inflammation does not occur unless there be present at the seat of injury something analogous to the contagia which are the acknowledged necessary agents in the production of specific diseases. In all cases we must now distinguish between the contagium, or proximate cause, and the injury in presence of which it is enabled to act.

This doctrine has, however, only very gradually been established. In 1871, Dr. Sanderson made, with Dr. Klein, some very important researches on suppuration. It was found that the presence of microphytes, either cocci or bacilli, was so characteristic of such a condition that there seemed little doubt that it was to them that the pus owes its infecting properties. During the subsequent years many observations were made which threw light on the part played by microphytes in the causation of inflammation. It was found that the effect of the introduction of microbes into an animal depended very much on local conditions as well as on the nature of the microbes introduced. As a rule, if the matter introduced could become rapidly absorbed, no harm would arise, but failing this, inflammation was produced. This knowledge led to the introduction of the principle of drainage in surgery. The inference drawn at that time still holds good at the present day,—viz., "Air enclosed in a serous membrane is harmless, water is harmless, even septic organisms are harmless, provided that they are rapidly absorbed." Danger at once arises, however, if any of these should remain in a cavity, which, although inside the body as regards temperature, is outside it in so far as it is beyond the reach of living tissue. A further great advance was made when it was recognized that all microbes were not equally harmful. A distinction was discovered between microbes on the one hand which lived on dead tissue (pure saprophytes) and those which had the power of attacking living protoplasm. Without some such idea, it had been impossible to account for the examples of pyæmia supervening on valvular disease in the absence, apparently, of the introduction of infective material from without. The secondary foci of inflammation always contained microbes of definite appearance, whose presence could not be accounted for without a knowledge of their parasitic properties.

Such was the knowledge possessed till 1880. Then came the most important discovery that in all ordinary cases of acute suppuration the pus contains microphytes which are special to it. This was developed still further when, by the aid of Koch's new methods, it became possible to separate species of microbes from each other and to obtain them in pure cultures. These facts were brought to light in the first instance by Professor Ogston, who found that in sixty-four abscesses all contained microbes of some sort: seventeen contained chains only, thirty-one only clusters, and the rest contained both. He found that liquids containing any of these were capable of setting up suppuration when injected subcutaneously, but that the resulting lesions differed in the two cases. Staphylococcus produced a circumscribed abscess, whereas streptococcus always found its way into the neighboring lymphatics.

The lecturer then proceeded to describe the lesions produced by the yellow cluster coccus (staphylococcus) and by the chain coccus (streptococcus). The difference in action between these two seems to be rather of degree than of kind. They first attack and finally destroy the vitality of whatever living tissue is brought within the range of their influence. In all vascular tissue they produce congestion, exudation, and emigration of leucocytes; in fact, the first stages of inflammation. This access of cells, etc., appears to be a protective process, and it seems that though these cells are constituents of a morbid process; they aid in the destruction or elimination of the *materies morbi*. Dr. Sanderson will not admit, however, that this action in attacking and incorporating microbes is the chief or only way in which the human or animal organism protects itself.

In his second lecture the orator discussed the chemical origin of inflammatory processes. One cannot now dogmatize so far as to say, as did Weigert formerly, "No suppuration without bacteria." Indeed, one must, in a way, return to the old doctrine, and maintain that the proximate cause of suppuration is

always chemical, for it has been conclusively proved (1) that suppuration can be produced by chemical agents without the presence of microbes, and (2) that when it is produced by microbes the action is really chemical. This is a startling statement, but one which must, nevertheless, be accepted, for the experiments of Councilman and of Scheuerlen prove conclusively that sterile abscesses can be produced by the aseptic subcutaneous introduction of perfectly sterile irritant liquids. The second point has been proved by very numerous experiments on devitalized cultures of pus-producing microbes, which will produce sterile suppuration quite as readily as the irritant fluids above mentioned.

The behavior of leucocytes in relation to microbic infection has for several years attracted the attention of pathologists. This wandering seems so purposive that it has repeatedly suggested the idea that the cells are guided by something like discrimination. Of late, in the hands of Metchnikoff, the theory that leucocytes are endowed with special protective powers against contagious microbes, which they first swallow and then digest, has been so ably advanced that it has exercised a marked influence on our views. The doctrine of phagocytosis has to include also an explanation of the manner in which leucocytes are drawn to the seat of inflammation, and this receives apparently a very complete solution from the study of the attractive influence of the substances produced by the microbes,—chimiotaxis, as it is called. To see this, it is only necessary to introduce into the dorsal lymph-sac of a frog a capillary tube containing a sterile culture of some pyogenic microbe. On withdrawing it, after a time, it will be found full of leucocytes. That this is not due merely to irritation may easily be proved by introducing simultaneously another tube containing some indifferent fluid, such as fresh frog's bile. This tube, on being withdrawn, will not be found to contain any leucocytes. Metchnikoff argues that the cells in thus "going for" bacterial products are actuated by an almost conscious selection as to what is good and what detrimental to the organism as a whole. The facts do not, however, warrant this idea. Indeed, in what follows, Dr. Sanderson shows himself by no means a partisan of "Metchnikoffism." Metchnikoff's theory, put simply, rests on a theoretical conception,—namely, that the powers of a leucocyte to enclose any small particle present in the medium in which it lives is an attribute derived by inheritance from the remote progenitors of the animal of whose body it forms a part,—that is, eventually from amœba and less remotely from cœlenterates, the mesodermic cells of which enjoy this power to a marked degree. The phenomena have been known for years, but it remained for a morphologist, like Metchnikoff, to point out that we misinterpreted them, and that they form really a protective mechanism. He further pointed out that these "phagocytes" are of two kinds, and calls them distinctively "microphages" (leucocytes, etc.) and "macrophages" (connective-tissue corpuscles, giant cells, etc.). When the body is invaded by microbes, Metchnikoff imagines a "struggle for existence" to occur between microbes and phagocytes. In this struggle the leucocyte is supposed to "adapt itself to its surroundings." Not only this, but the adaptation thus acquired is said to be transmitted to its posterity, thus explaining their protective power. All this is extremely attractive, and there seems a very enormous amount of evidence in its favor. I have not room here to give all the facts quoted by the lecturer as advanced by Metchnikoff in support of his theory. Suffice it to say that the subject has been approached in three different ways,—namely, 1, by ascertaining in what way the multiplication of microbes within the body is affected by the intervention or exclusion of leucocytes; 2, by direct observation of the changes which the swallowed microbes undergo when watched under the microscope; and, 3, by comparing susceptible with insusceptible animals in regard to the manner in which they deal with microbes when introduced into their bodies. By a very ingenious series of experiments, Metchnikoff, following all these three directions, has obtained what seems, at any rate at first sight, very strong proof of the accuracy of his views. The part of the "macrophage" is, according to him, secondary to that of the "microphage," which forms the first line of defence against microbes. If this line be broken through, the second line, and generally an ineffectual one, is constituted by the large tissue-cells of the liver and spleen.

Hess and Bouchard are often referred to as supporters of the phagocytosis theory, but neither of these observers can be said to go the whole length with Metchnikoff in admitting the selective power of the cell. Neither observer appears to admit more than the mechanical action of the cells. They do not admit with him (1) that the devitalization of microbes is a special and exclusive privilege of phagocytes, and (2) that leucocytes can

discriminate between contagious particles of different kinds, and that they exercise this power of choice "for the good of the organism."

Passing to another phase of the subject, the lecturer went on to suggest that there is a link between local reaction and liability to infection, not of the nature of that suggested by Metchnikoff, but as products of the same antecedent conditions. The explanation offered by Dr. Sanderson, that a virus of great intensity does not produce festering, is that it is *intense;* in other words, that the same agent which in smaller concentrations excites exudation and emigration, paralyzes these processes when in greater intensity. Now, Bouchard's researches have thrown much light on this difficult subject. They are not quoted at any length, but their starting-point was undoubtedly the observations of M. Charrin on the microbe of blue pus. When injected into the blood this produces very definite symptoms, —collapse, intense enteritis, and death. The separated products of this bacillus are also capable of producing just the same train of symptoms. Now, it is this substance which possesses the required power of inhibiting local reaction. In the rabbit, cultures of the bacillus produce, when injected, death without suppuration; in guinea-pigs, which are more resistant, death does not occur, but a local inflammatory process at the seat of injection. Now, prepare a guinea-pig by first injecting it with a sterile culture, and it becomes to all intents and purposes a rabbit, dying after inoculation without any sign of local mischief. Bouchard says that this change is not due, as suggested by Metchnikoff, to a paralysis of amœboid cells (a negative chimiotactic action), but to a general action on the whole machinery of living tissues. He classes the chemical action of microbic products with such general depressants as cold, exhaustion, or even mere restraint of movement, each of which he shows to favor infection by diminishing local reaction.

What explanation, says Dr. Sanderson, can be given of all this but one,—namely, that in each instance the same cause which weakens local reaction weakens also in the same degree the defensive power of the organism as a whole against infection? In what this power of defence consists he has endeavored to set forth in the third lecture, which has just been delivered. Time and space will not allow me to do more at present than just to indicate the scope of this lecture. I must reserve its more detailed consideration for my next letter. This third lecture was divided into two great headings,—1, the question of mitigation (diminution of virulence); 2, that of acquired immunity and the various theories which have been advanced to account for it. In considering these he passes from the study of the "phlogogenic" to that of the "specific" infections. He describes the various means which have been found capable of diminishing the virulence of an infection,—growing at a high temperature, in an atmosphere of compressed oxygen, or in the presence of antiseptics. He notices also Pasteur's observations on the protective power of such attenuated cultures against infection with virulent material. I find, however, that I cannot do anything like justice to the material at my disposal before the mail starts, so with these few hints as to the nature of the lecture I must close this month's letter. Whether Dr. Sanderson has been quite just as regards the phagocytosis theory cannot be said until the whole of his evidence is before us.

Notes and Queries.

PRESCRIPTIONS AND PRESCRIBING.

Is the art of prescribing to be numbered among the lost arts? A correspondent, with some show of reason, would wish us to believe this question is to be answered in the affirmative. He gravely asserts that doctors study the advertisements of enterprising pharmacists more than their materia medica, and he fears that in the future patients will be as wise as their medical men if they take in the same literature. Doubtless the so-called elegant prescription, with its rigid adherence to the rules enforcing the presence of a basis, an adjuvant, a corrective, and a vehicle, is now rarely met with; and, although certain examining bodies still struggle to maintain the ancient Latin form of the prescription, yet little by little the Latinity seems to be slipping away. The symbols remain, but abbreviations obviate difficulties with doubtful genitives and undeclinable substantives of recent invention, and the directions are, more often than not, written at full length in English. It is difficult to account for these tendencies. Perhaps they are the result of the importance at present attached to the study of the various branches of science, which leaves little room for the cultivation of the older proud boast of languages. Perhaps they are the almost unconscious expression of

a feeling that in medicine the days of mystery have passed away. The prescription, with its mystic symbols, which merely indicated more or less unnecessary directions to the dispenser, although regarded with awe, is no longer felt to represent the acme of skill. Among certain classes of patients it retains its former potent sway, and continues to be interchanged among friends as a talisman; but the more enlightened sections of the public prefer to be treated as individuals, to whom special instructions of diet and mode of life mean almost as much practical benefit as the prescription. Moreover, in many instances they prefer to know what is being ordered, and although this knowledge may convey very little enlightenment, there may possibly be a certain satisfaction in finding two or three lines in the familiar vernacular. Consulting the wishes of patients, therefore, it would seem that it is scarcely worth the trouble to keep up a semblance of secrecy on paper. On the other hand, for those in the profession who can, but do not, write their prescriptions in Latin, the explanation may possibly be found in some unavowed lack of confidence in the subsequent translation of their directions. Many venerable jokes upon this subject have had their serious side and effect. While they have served as object lessons to young dispensers, they have equally caused a gradual disinclination on the part of the prescriber to run any facetious but undesirable risks. But apart from the way in which the directions are written, the component parts of the prescription fall under eager scrutiny. The small mystifications of Fowler's solution, of soap pill, of spirit of Mindererus, or even of solution of trinitrin, cannot hold out against the inquiring spirit of the age. Patients have been known to go to the nearest free library to solve the problem. Perhaps one natural outcome of this is the "growing tendency," of which our correspondent complains, to prescribe secret and special nostrums. "When patients become aware that they have paid for a prescription of 'somebody's syrup' which they may have tried before or may have seen recommended in the daily papers, they are inclined to think the fee is wasted, and to lose faith in the doctor; while if they get relief from the patent compound, they tell all their neighbors how to do without the doctor." He further complains of the loss and inconvenience occa sioned to the chemist by embodying in a prescription certain preparations to which the names of the makers are attached. In the modern nomenclature of diseases many proper names, undesirably, as we think, are linked to groups of symptoms, for the convenience of abbreviation or with the intention of conferring honor; but is there any justification for the extension of this principle to drugs? Is there any gain in selecting the tincture, syrup, or pill prepared by any particular firm? Our correspondent thinks not, and does not hesitate to employ a harsh term to those addicted to this practice. Still, there are two sides to every question. These preparations have frequently been most carefully made, with appliances whose cost can only be met by wholesale manufacturers. They are usually prepared with every conceivable precaution for insuring uniformity of strength, and when their efficacy has been repeatedly tested, it seems somewhat hard to accuse those who employ them of quackery. The term is only appropriate when such substances take the place of a prescription, the prescriber being alike ignorant of their compositions and actions.—*Lancet*, October 17, 1891.

PARALYSIS AFTER A SUBCUTANEOUS INJECTION OF ETHER.

EBERHART (*Centralbl. f. Gynäkol.*, No. 12, 1891), having observed cases of paralysis after subcutaneous injection of ether, has carefully gone through the literature and has succeeded in finding but few cases. In one case reported by Remak the patient, who lay comatose after poisoning by carbonic acid, received a subcutaneous injection of ether into the extensor side of the forearm. There resulted a partial paralysis of the radial nerve, which was limited to the extensor communis and abductor pollicis longus. Three years before he had observed a similar case, the muscles of the index finger only being spared, which required four months until the muscles recovered their power completely. He regards ether as having a specially deleterious action upon the peripheral, and especially here upon the deep branch of the radial nerve, after its piercing the supinator brevis. In Mendel's case the paralysis involved the third and fourth fingers, with reduction of sensation immediately after an injection into the extensor side of the right forearm. There was no reaction of degeneration, but the galvanic and faradic incitability were reduced. Restoration took place in three weeks. In a case of Neumann's, the patient, a consumptive, received two subcutaneous injections, one into

each forearm. The points of puncture became, on the third day, painful and swollen; on moving the hands, there was painfulness of the extensors and diminished mobility of the middle fingers. The paræsthesia soon disappeared and the mobility of the fingers soon was restored entirely. The writer can only find these cases in the international literature. [There is a case reported in the *Edinburgh Medical Journal*, 1890, of "Local Paralysis after Ether Injections," where the writer collected several cases unmentioned by Eberhart. The Index Catalogue of the Surgeon-General's Library at Washington gives some cases which are also left out in the *Edinburgh Journal* article.—TRANS.] The writer adds a fourth case to the list from his practice, and calls particular attention to the danger of using ether injections in collapse during operations and childbirth, which point is by no means dwelt upon or even mentioned in the text-books. Schröder is the only writer who advises one to give the injection cautiously and not deeply. The writer administered, during the course of an operation for prolapse of the uterus, on account of collapse, a subcutaneous injection of ether into the right forearm. The next day it was observed that she could not extend the third, fourth, and fifth fingers. After forced extension the fingers would fall back into the half-clinched position. Faradization was employed while she lay abed, but the paralysis remained unaltered. Only after four weeks did she begin to move her middle fingers, and after six weeks was the mobility of the fingers restored. The writer, on account of the persistence of the paralysis, is of the opinion that the point of the hypodermic needle must have struck a branch of the radial nerve, or that the ether set up a neuritis. Whatever may be the explanation, he advises greater care in the use of ether. Tincture of musk or oleum camphoratum may be used as substitutes, for they act fully as well as stimulants, and have no such disagreeable side action. If one will use ether, then one should inject where the nerve-branches are few in number and well covered by skin and fat.—*Journal of Nervous and Mental Diseases*, October, 1891.

ABSORPTION OF PROTEIDS.

R. NEUMEISTER has made a large number of researches on this subject, which are conveniently grouped in the *Zeitsch. f. Biologie*, 1891, xxvii. p. 309. It is well known that some proteids when introduced directly into the blood-stream are excreted as foreign bodies, while others are not so excreted. Neumeister finds that those proteids which, when injected into the blood of dogs, are not excreted by the urine as foreign bodies, but are assimilated, are such proteids as those which, when introduced into the stomach, can pass from the stomach and intestine *via* the absorptive channels without undergoing change by the digestive processes. They are syntonin and albuminate,—that is, alkali-albumen from egg albumen,—muscle syntonin, phyto-vitellin from the seeds of the gourd, and pure serum albumen. Those proteids, however, which do not pass into the blood without undergoing change in the process of absorption, are excreted as foreign bodies; for example, normal egg albumen, casein, hæmoglobin, albumoses, peptone. The experiments of many previous observers have shown that probably the peptone formed during digestion is transformed into coagulable albumen in the mucous membrane of the intestine. Neumeister, by a single experiment, has demonstrated this "peptone-changing" function of the mucous membrane of the small intestine. If a piece of "surviving" intestinal mucous membrane be taken from an animal just killed, and if it be added to blood containing peptone at 40° C., and the whole well ventilated with air, after a time a very considerable quantity of the peptone disappears, and the same is the case with the albumoses; but in the case of albumoses they are first changed into peptone. This peptone changing function of the intestinal mucous membrane is found in the small intestine of the dog, rabbit, pigeon, and pike, and is possessed by the liver of the rabbit, but not by that of the dog, nor can the kidney, muscles, or blood of the dog effect this change.—*British Medical Journal*, October 10, 1891.

IODO-NAPHTHOL-BETA—A SUBSTITUTE OF ARISTOL.

DR. BRAILLE has recently prepared, with beta naphthol, a new iodated derivative analogous to aristol, to which he has given the name of iodo-naphthol-beta, or naphthol-beta diodide. It is prepared by mixing a solution containing 24 grammes of iodine and 27 grammes of potassium iodide with another solution containing 110 grammes of naphthol-beta and 40 grammes of caustic soda. There is then added a little solution of the hypo-

chlorite of sodium corresponding to ten times its volume of chlorine. Iodo-naphthol is then precipitated in the form of a greenish-yellow powder, which is to be washed and then dried, the greenish color becoming more marked on exposure to the light.

This body is said to be inodorous and tasteless, insoluble in water, partially soluble in ether, very soluble in chloroform, and scarcely soluble at all in alcohol or in acetic acid.—*Répertoire de Pharmacie*, November 10, 1891.

LYSOL—THE CRESOLS AS DISINFECTANTS.

The first question suggested by such a title is naturally, What are the cresols exactly? In order to answer this it is best to go back to the beginning and to start with coal-tar, the product (with coke and illuminant gas) of the dry distillation of coal. By fractional distillation this coal-tar is separated into parts, having various boiling-points, principally as under—

1. A small fraction (amounting to two to four per cent. of the tar) containing what passes over at 80° C.,—namely, ammonia, carbon bisulphide, methyl cyanide, alcohol, amylene, benzene and its homologues.

2. The light oil; forms six to eight per cent. of the tar, and includes the constituents boiling between 80° and 210° C., chiefly made up of benzene and its homologues, with some naphthalene, phenols, and bases.

3. The heavy oil, thirty-two to forty per cent. of the tar; this is made up of what goes over between 210° to 400° C., and consists of naphthalene, phenols, high boiling bases, anthracene, phenanthrene, fluorene, and other hydrocarbons.

The residue in the retorts represents—

5. The pitch, in quantity of from fifty to fifty-five per cent.

The heavy or creosote oil on cooling deposits solid naphthalene; the separated oil is treated with concentrated soda lye, the insoluble part separated from the dissolved sodium phenol, and the latter decomposed by sulphuric, carbonic, or sulphurous acid. Crude carbolic acid rises to the surface of the solution of sodium sulphate, carbonate, or sulphite. By fractional distillation of this crude acid between 185° and 205° C. cresols are obtained, which appear to consist of a mixture of the so-called ortho- and para-cresol, and have the general formula $C_6H_4CH_3OH$, from which it will be seen that they are carbolic acid, or phenol (C_6H_5OH), in which one hydrogen atom is replaced by a methyl group, CH_3. What a difference in some physical properties this replacement of an atom by a group makes we shall see presently.

Ortho-cresol, or orthotoluidine, melts at 31° C. and boils at 185° to 186° C.; meta-cresol is a thick liquid that even at 80° does not solidify, and boils at 195° to 200° C.; para-cresol occurs in colorless prisms, melting at 36° C. and boiling at 198° C. They are all practically insoluble in water.

Lysol, which is obtained by dissolving in fat, and subsequently saponifying with the addition of alcohol, the fraction of tar oil which boils between 190° and 200° C., is a brown, oily-looking clear liquid, with a feebly aromatic creosote-like odor. It contains fifty per cent. of cresols, and is miscible with water to a clear saponaceous, frothing liquid; it also forms clear solutions with alcohol, petroleum or benzene, chloroform, carbon bisulphide, and glycerin.

The essentials of a perfect ideal antiseptic may be briefly stated as follows:

1. It must be soluble in water, and ought to be clearly so.

2. It must arrest the development of pathogenic bacteria, even in very dilute solutions, and after a comparatively brief period of action.

3. It must be harmless,—that is, non-poisonous and non-corrosive.

4. It must not be too expensive.

Lysol meets these requirements.

It forms clear mixtures at once, in every proportion and at all temperatures, with distilled water, or ordinary well-water.

The mixture possesses—and therein lies a prominent advantage of lysol—the property of a saponaceous solution, which renders the use of a special soap in surgery quite unnecessary. The generally complicated processes of cleaning and disinfecting the area of operation are completed in a single act,—viz., an energetic brushing with the solution of lysol. It acts in a manner equal to the best soap as an excellent cleaning agent, which removes all dirt, fatty or resinous spots, etc., from the skin as well as from the surroundings, linen, instruments, and the like.

Lysol is superior in bactericidal power to carbolic acid and other preparations of the higher homologues of phenol, and is possessed of powerful deodorizing properties.

Lysol is neutral. In alcoholic solution phenol-phthalein produces no change. In aqueous solution a reddening appears, but this is traceable to the recognized dissocia-

tion of neutral soaps under such circumstances into acid salt and alkali. It is also free from poisonous properties—the relative harmlessness of the cresols even when taken internally in large quantities has been often demonstrated—and is non-caustic. The mucous membrane is unaffected by the application of a one-half-per-cent. solution, and though stronger concentrations produce a more or less pronounced sensation of burning, this disappears on the application of a little plain water.

Lysol has been introduced into a number of surgical, and particularly in lying-in clinics, from the experiences of which it has been concluded—

1. That through its simultaneous cleansing and disinfectant action, in conjunction with its relative non-poisonousness, lysol is superior to the disinfectants commonly in use.

2. That its application is more convenient and less dangerous than that of any of the other agents of the same class.

As has been already intimated, lysol has been largely and satisfactorily used in midwifery, for irrigation of the uterus and vagina, and in gynæcology generally, where its powerful deodorizing properties prove of the greatest value.

In surgery generally it is being extensively adopted in one- and two-per-cent. solution for the disinfection of the operator's hands, of the field of operation, of instruments, sutures, etc., and for irrigation of wound surfaces. Amputations, extirpations of various tumors, operations for hydrocele and hernia healed in the most satisfactory manner, and partly by first intention.

Dr. Unna has used lysol in various skin-diseases in the form of a plaster mull, and was favorably impressed with it; he classed it among substances which do not produce pain. It will prove valuable in the treatment of rhino-pharyngeal and laryngeal diseases, as well as in affections of the middle and external ear. In short, the application of lysol is indicated wherever any morbid processes associated with the formation of pus and other disintegration products are going forward. It should also be tried in skin affections, especially eczema, or such as are of parasitic nature, and in the treatment of burns and wounds generally.

Lysol forms an efficient general disinfectant. The walls of a room, and the dwelling generally, may be freed from germs by the intelligent and thorough use of a spray containing a one- to three-per cent. solution. It seems likely that lysol may become a permanent institution in the household for the purpose of domestic cleaning, the disinfection of sputa, etc. For such uses its saponaceous character and perfect solubility in water again manifest themselves as not the least important among its many advantages over other substances of the same class.—*Pharmaceutical Record*, November 12, 1891.

THE TREATMENT OF POSTERIOR URETHRITIS.

To avoid the irritation produced by the catheter in this affection, Dr. Rona makes use of an irrigator provided with an olive-shaped rubber tip. By inserting this into the meatus it is possible to wash out the entire urethral canal, which can seldom be accomplished by the syringe. With the syringe the force of the injected fluid is expended upon the anterior part of the canal, while the resistance of the compressor urethræ is not overcome, but by the employment of the irrigator the resistance of this muscle can be overcome in a few seconds, especially if the patient's attention is diverted by conversation. The quantity of fluid to be injected varies from 100 to 150 grammes; it should be lukewarm and of unirritating character (*Monatsh. f. Prakt. Dermatolog.*, Bd. xii. Hft. 11, 1891).—*International Journal of Surgery*, October, 1891.

BROMOFORM IN WHOOPING-COUGH.

The statistics which we have from time to time published as to the value of bromoform in the treatment of whooping-cough have been extended by the report by Dr. Schipper of one hundred and forty-nine cases in which this remedy was employed (*Gazette Médicale de Paris*, November 7, 1891). The age of the patients varied between 4 weeks and 8 years; the remedy was given in doses varying from 1 to 5 drops, suspended in sweetened water, the quantity varying according to the age of the patient, and administration taking place four times daily. The author states that his results were more favorable in summer than in winter, while the fact that in some instances treatment was prolonged for more than eight weeks shows conclusively that this remedy does not exercise any specific action on whooping-cough. Nevertheless, the author maintains that, administered in the above doses, it is perfectly

harmless; that it rapidly diminishes the number and violence of the attacks, while under its influence the duration of the malady is decidedly reduced. After two or three days' treatment vomiting ceases, as well as hemorrhages from the mouth and nose. Further, the remedy is claimed to prevent complications, such as pneumonia, by the diminution in the congestion of the thoracic organs which is apt to result from the violence of the cough.

A NEW THEORY OF THE FUNCTIONS OF THE CEREBELLUM.

In the present state of our knowledge, or rather ignorance, concerning the function of the cerebellum, it is interesting at least to note the various theories suggested concerning it, and it may be useful as well, since it is by comparing the different theories, and weighing the evidence brought forward in support of each, that we shall finally arrive at definite knowledge concerning this mystery of the nervous system. Since Flourens's time it has been pretty generally believed that the cerebellum has a purely motor function, and although it is not now regarded as a co-ordinating centre, still this observer's dictum, that a man "no more thinks with his cerebellum than he does with his diaphragm," is still accepted by many as true. Recently, however, DR. COURMONT, of Lyons, was led, during the course of a clinical study, to look more closely into the question of cerebellar physiology, and the result of this investigation has caused him to reject the previously-accepted view of its motor function as incorrect. The statement and arguments for his theory, which is substantially that put forward rather timidly by Jessens in 1869, but which found little acceptance among physiologists, are contained in a book now in press, advance notice of which is published by Professor Folet in the *Bulletin Médicale*, No. 45, 1891.

Briefly stated, Courmont believes that the cerebrum and cerebellum are similar in function as well as in structure. Just as the cerebrum is not only a motor organ, but the seat of cogitation as well, so the cerebellum is a centre for the registration of certain impressions, and for the origin of various psychical manifestations. The cerebrum is the seat of the higher mental faculties, such as thought, judgment, comparison, etc., while the cerebellum is that of the unreasoning mental processes, as love, hatred, joy, sorrow, etc. The one is the organ of sense, the other of sentiment.

This theory is a much more pleasing one certainly than that of co-ordination, and Dr. Courmont puts forth some well-reasoned arguments in support of it. We cannot go very far into these arguments in this place, but shall quote only the main points of his theorem, referring the reader to the work itself, or to the review of it in the journal above mentioned, for a fuller exposition of the subject.

The first argument is the anatomical one, that the cerebellum is similar in its general construction to the cerebrum, and though the latter is much larger and of more complicated arrangement interiorly, yet the former is relatively richer in gray matter, which is the organ of the psychical functions. It may also be noted that the cerebellum in women, in whom, with all gallantry it may be said, sentiment is relatively more developed than reason, is larger in proportion to the cerebrum than it is in man. Again, the motor fibres from the cord pass forward and enter the cerebrum, while the sensory fibres incline backward and pass into the cerebellum. Kölliker, indeed, noted these anatomical peculiarities, and remarked that they ill agreed with the modern theories relating to the motor functions of this portion of the encephalon.

Use is also made of incidental testimony furnished by physiological experiments performed with other objects in view. Thus, it was noticed by Vulpian and Ferrier that animals deprived of both cerebral hemispheres might yet experience painful sensations and give expression to various emotions,—a conclusive proof, the author holds, that the remaining intra-cranial structures, the cerebellar lobes, must be the seat of these emotions.

The main facts, however, upon which Dr. Courmont relies to establish the correctness of his theory are those furnished by clinical study and corroborated by post-mortem examination. It was the study of a case of puerperal mania which first led him to doubt the correctness of the prevailing theory of the cerebellar functions. The woman was apparently perfectly rational when speaking upon matters of fact, but became at once delirious whenever a word was spoken suggestive of sentiment or affection. If these two fundamental faculties of understanding and sentiment resided in cells of the cerebral cortex, it was difficult to understand how a circulatory disturbance such as this could affect one set of cells and leave the adjacent ones in

their normal state. It was thus that he came to the belief that the cerebellum was something more than a mere regulating switch-board for motor impulses. Dr. Folet cites a few of the clinical observations found by the author in a diligent search through the literature of the past several years, in which autopsy showed lesions of the cerebellum. One case was that of a woman, who was morbidly timid, the least thing sufficing to arouse her fears, which, in her childhood, would be expressed by screams and weeping, later by a simple trembling and flight. Yet in other ways she was rational enough, and could converse connectedly with any one of whom she had learned not to be afraid. She had not a trace of sexual feeling. On autopsy there was found to be an absence of one half of the cerebellum. A second case was that of a child, who had always exhibited an utter indifference to everything, expressing no pleasure and no pain, yet possessing normal muscular power, and replying sensibly, though in monosyllables, to any question put to her. Upon her death, at the age of 11, there was found to be a complete absence of the cerebellum. A man died, at the age of 39, who had been regarded during life as an idiot; yet he had a high degree of a certain form of intelligence. He escaped six times from the asylum in which he was confined, making his way out by means of false keys which he fabricated himself. His time was passed chiefly in reading the various reviews, and it was stated that he had a ready and sure wit in everything relating to concrete matters. He was, however, without any sentiments of honor, affection, gratitude, or the like; was a liar, a thief, and in every possible way immoral. On autopsy he was found to have had a very minute, though well-formed, cerebellum.

In a number of experiments made upon rats, M. Courmont found that when the cerebellum was removed these animals became profoundly apathetic, and showed neither fear nor anger when disturbed. Yet they were not in a stupor such as is seen after removal of the cerebral hemispheres, for they could walk about, and would approach of their own accord the vessels containing food and water. In those in whom only a part of the hind brain was removed, inflammation of the remaining portions taking place, there arose a state of exaggerated impressionability, the slightest noise sufficing to excite them beyond measure.

A number of arguments, in their way corroborative, are drawn from comparative anatomy, it being shown that the cerebellum is developed in different orders of the animal kingdom in exact proportion to the existence in them of the affections. Thus, in reptiles and fishes, in whom the sentimental faculties may be regarded as barely existent, the cerebellum is almost rudimentary. It is most developed in the ray and the dog-fish, and these, of all fishes, are precisely the ones that betray the existence of some affection in the care which they take of their young, and in the fact that the male and female couple. Next to man, the dolphins, seals, sea-lions, and other marine mammifers have the best-developed cerebellum, and this agrees with the fact that they are among the most sociable and affectionate of animals. If the cerebellum were the organ of muscular co-ordination, it ought to attain its greatest development in those animals that are the most active; yet in the squirrel it is less developed than in most other mammals.

There is much more that is interesting in Dr. Courmont's argument, as foreshadowed in the review by Dr. Folet, but we have quoted enough to show that the author is not wholly carried away with a theory, but rests his belief upon facts which he believes to be convincing, even though others may not be ready to accept all his conclusions.—*New York Medical Record*, November 14, 1891.

METHYLENE BLUE IN MALARIAL FEVER.

Struck by the affinity of methylene blue for the supposed micro-organism of malaria, DRS. GUTTMANN and ERLICH have tested the value of this substance in the treatment of malaria, employing it in one case of tertian fever and one of quotidian ague. In both cases the attacks entirely ceased in a few days, and the plasmoids disappeared completely from the blood. These authors administered seven and a half grains daily of the methylene blue in five divided doses, the capsules being administered at intervals of three hours in the tertian fever and intervals of one hour in the quotidian fever, the administration in the latter case commencing twelve hours before the expected attack. They found that, with the exception of slight vesical irritations, this substance was well supported. The renal and intestinal excreta assumed an intense blue color, the quantity of the former being considerably increased. It does not produce albuminuria.—*Répertoire de Pharmacie*, November 10, 1891.

IODOFORM INJECTIONS IN GOITRE.

Dr. Kapper, an Austrian military surgeon, has employed in fifteen cases, with invariable success, Mosetig's plan of injecting iodoform emulsion into soft thyroid tumors. In every instance there was a diminution in the circumference of the neck amounting to from eight to ten centimetres. Antiseptic precautions were employed, and in some cases, where the tumor was of considerable dimensions, several syringefuls were injected into different parts of the parenchyma. In order to ascertain whether the needle has entered the gland, the patient is asked to swallow, when, if it has so entered, the downward movement of the syringe shows that the needle has been carried upward. In some cases the injections were repeated daily for several days, in others at intervals of a few days. In no cases were any untoward symptoms produced.—*Lancet*, October 17, 1891.

THE TREATMENT OF OTORRHŒA BY CAMPHORATED SALOL.

Dr. Pégou recommends the use of camphorated salol in the treatment of suppurative otitis of the middle ear. He prepares this compound by mixing 20 parts by weight of powdered camphor with 30 parts of salol, and warming gently until fusion is complete, but without adding either alcohol or water. It then must be filtered and preserved in an hermetically-sealed green glass bottle.

Camphorated salol is an unctuous liquid, which is colorless, insoluble in water, very soluble in ether, chloroform, and oils. It readily decomposes when exposed to the air or the light.

The author's mode of employment is to first thoroughly cleanse the external auditory canal and tympanum, and then introduce into the ear a small pledget of absorbent cotton impregnated with the camphorated salol. This should not be allowed to remain more than twenty-four hours, or even twelve hours, if suppuration is abundant, and the dressing should be applied every two days. During the intervals the ear should be well syringed out with warm solution of boracic acid. According to Dr. Pégou this mode of application of camphorated salol, when associated with appropriate general treatment, will, in the large majority of cases, cure most forms of suppurative otitis, the treatment rarely lasting longer than three weeks. In the most rebellious cases, however, the camphorated salol may only be expected to reduce the quantity and offensiveness of the secretion. Camphorated salol is neither painful nor irritating when so employed, and in the author's opinion is far preferable to all other remedies hitherto employed in the treatment of otorrhœa.—*Les Nouveaux Remèdes*, September 24, 1891.

COFFEE AS AN ANTISEPTIC.

The experiments of Luderitz, of Vienna, tend to establish the belief in the antiseptic properties of coffee. A strong solution of coffee, for example, ended the career of a bacillus of typhoid in about twenty-four hours, the active streptococcus of erysipelas in twelve hours, while not longer than from three to four hours was sufficient to kill the malignant comma bacillus of cholera. Stronge decoctions acted more quickly still; the effects, however, are stated to be due more to the products of the roasting of the coffee than to the active principle of the berry. In this connection, it has been pointed out by a correspondent of the *Indian Medical Gazette* that it would be worth while to substitute coffee for tea among the cases of enteric fever in the European military hospitals in India. Coffee also might be given a trial in the treatment of cases of typhoid fever in this country. As a beverage, doubtless, it would be appreciated by the patient, and in the light of Luderitz's researches there is just the possibility that it might have some controlling influence over the disease.—*Medical Press*, September 9, 1891.

RAISING CHILDREN IN BRAN.

This method was proposed by M. Pue at the *Société Normande d'Hygiène Pratique.* It consists of a cradle which has the wooden bottom taken out, and is then lined with a strong cloth. In this is placed sterilized bran to nearly half a yard in depth. A hair pillow is used. The baby has only a short flannel shirt on, and is naked from the navel downward. It is covered with a woollen blanket, and a wool-lined dress is kept to put it in when taken up for nursing. It has thus full liberty of movement in all its limbs, while its dejections pass at once into the pure bran, keeping the child dry and clean, even if there is diarrhœa. This method is a cheap one, the bran not costing as much as diapers.—*Boston Medical and Surgical Journal*, October 15, 1891.

A NEW TREATMENT OF TYPHOID FEVER.

DR. TORDEUS prescribes antifebrin associated with resorcin in doses of from 3 to 5 grains dissolved in dilute alcohol. Sometimes he employs thymic acid, in doses of 7½ grains, combined with the two preceding substances, the preparation being given in teaspoonful doses every three hours. The author maintains that by this mode of treatment the temperature is markedly reduced, bodily strength is preserved, loss of weight does not occur, and the association of these remedies enables them to be employed in such small doses that they are practically innocuous. This combined method of antipyretics and antiseptics can, however, hardly replace either the treatment with quinine in large doses—15 to 20 grains to a child over 5 years of age—or the treatment with cold baths, since recent researches, especially of Roque and Weil, seem to show that the toxic matters of typhoid fever are more rapidly and more completely eliminated under the influence of cold baths than by any other method.—*Revue des Maladies de l'Enfance*, November, 1891.

BENZINE AS A PREVENTIVE OF TRICHINOSIS.

DR. PUTTER, JR., of Stralsund, reports in the *Deutsche Medicinische Wochenschrift* on the favorable effect of benzine after the consumption of pork full of trichinæ. A pig had just been killed, and some hours after twenty-seven people had eaten of the meat the inspector informed the owner that the animal had been suffering from trichinosis. All the twenty-seven people, adults and children from 14 to 17 years, had boiled pork for dinner; the wife of the owner and four other women, in making sausages, had repeatedly tasted the raw material. Dr. Putter was informed of the mishap on the same evening, and prescribed two hundred and seventy gelatin capsules, each to contain 7½ grains of benzine, each person to take five capsules the next morning before breakfast, and an hour later a large teaspoonful of pulv. rhei and pulv. glycerrhizæ co. in equal parts, the children, of course, less in proportion. The same dose was to be repeated in the afternoon, and the purgative only the next day. The benzine was well borne by all the patients, a few only complaining of malaise and eructations, but none of them vomited. Eight months later all the twenty-seven people were still perfectly healthy, as were the women who had tasted the raw sausages. Dr. Putter is so convinced that his treatment alone prevented the people from being attacked by trichinosis that he recommends it warmly in all similar cases.—*Lancet*, October 17, 1891.

THE CARDIAC ACTION OF CACTUS GRANDIFLORA.

DR. E. BOINET terminates an elaborate experimental study as to the physiological action of cactus and its active principle with the following conclusions (*Bulletin Général de Thérapeutique*, October 30, 1891):

In ten minutes after the injection of the first dose in frogs the cardiac energy increases, but this systolic increase in energy is transitory, although it may be continued with the repetition of the dose. With large doses the pulse is slowed, and in the final period of the poisoning is accompanied by disturbed rhythm. Tactine is further stated to produce the stimulating effect on the heart in a more marked and more permanent degree than the extract of cactus, and, unlike the latter, does not lead to slowing of the pulse. In his clinical experiments the author found that 40 drops of the tincture of cactus are without effect, although in cases of disturbed compensation in various forms of heart-disease 80 to 100 drops acted as a valuable cardiac stimulant.

In cases of nervous disturbance of the cardiac rhythm 80, 100, or 120 drops were given daily for weeks at a time, and are said to have greatly improved the regularity of the heart's action without the production of any evidences of accumulation.

ECZEMA AS A CONSEQUENCE OF THE EXTERNAL USE OF SALOL.

Salol, even in doses of 60 to 90 grains, is well tolerated by the digestive mucous membrane, but when employed externally on a mucous surface it is apt to produce eczematous inflammations; thus two cases have recently been reported by DR. CARTAZ in which insufflations of powdered salol were employed after nasal operations. In both cases marked eczematous eruption resulted on the external nares and upper lip, and in one case extended over a great part of the face. A similar eruption was also produced in a third case suffering from rhinitis with ulcerations of the external nares, in which a ten-per-cent. salol ointment in vaseline was em-

ployed. The author explains these results as attributable to the decomposition of the salol into its two components, phenol and salicylic acid, produced under the influence of fatty bodies. In the cases under consideration its decomposition was probably produced by the sebaceous secretion of the skin.—*Les Nouveaux Remèdes*, November 8, 1891.

THE LAW OF PERIODICAL FUNCTION IN WOMEN.

OTT (*Wiener Med. Presse*, February 8, 1891) reports some observations, not exclusively upon menstruation, but upon the various vital processes occurring in women during the period of generative activity. These processes correspond in time to the hemorrhage, —are associated conditions, with a dependent relation to it. Observations upon temperature, pulse, and blood pressure indicated that vital activity attained its maximum preceding the menstrual period, and declined at its commencement or immediately before. Sphygmographic tracings, muscle strength, and excretion of urea suffer similar variations. Observations were made at a certain hour each morning during prolonged periods, sometimes extending into the menstrual periods, upon heat radiation, muscle strength, pulmonary capacity, inspiratory and expiratory force, the tendon reflexes, in healthy women placed under the same condition; and a physiological functional periodicity of the female organism was demonstrated. To establish the connection between menstruation and this periodicity of function, it is necessary to determine if the rhythmical variations are independent of menstruation. A large number of observations made by Dr. Schichareff, under the guidance of Ott, upon pulse, temperature, and blood-pressure in girls between the ages of 8 and 13, and in women between the ages of 58 and 80 years, showed that no such periodical variations of physiological functions occur in females during the periods in which they are not capable of conceiving, and in which they do not menstruate.—*Archives of Gynæcology*, September, 1891.

ICHTHYOL IN THE TREATMENT OF ERYSIPELAS.

DR. KLEIN recommends the employment of ichthyol in the treatment of erysipelas. In such a disease as erysipelas, whose duration may vary between such wide limits, whose evolution may be subject to such great variations, and whose severity may be either slight or serious, it is very difficult to estimate the character of the results attributable to any remedy.

Dr. Klein has, however, restricted his conclusions to observations made on severe cases of erysipelas, and they are published in the *Gazette Médicale de Paris*, October 3, 1891:

1. Ichthyol undoubtedly exerts marked influence on the development of the micrococcus of erysipelas in the skin, which may be attributable either to the reducing action which this remedy exerts on the tissues, or to a direct action exerted on the pathogenic micro-organisms, or to both of these causes.

2. Treatment by ichthyol reduces the duration of erysipelas at least half.

3. Treatment need not be continued, as a rule, longer than three or four days. By this time the disease is usually cured.

4. Under the influence of ichthyol the disease follows a much more benign course.

ZINC GLUE FOR STIFF SURGICAL DRESSINGS.

TREUTLER recommends a preparation, first suggested by Unna, for obtaining stiff surgical dressings, such as are applied to fractured or dislocated limbs. It is as follows:

Oxide of zinc, 10 parts;
Gelatin, 30 parts;
Glycerin, 30 parts;
Water, 30 parts.

This is thickly applied and rubbed into the muslin or gauze forming the bandage. A thinner preparation contains 20 parts of gelatin and 40 parts of water, the other ingredients remaining the same.—*Quarterly Therapeutic Review*, October, 1891.

THE POINT OF ELECTION FOR PUNCTURE OF THE ABDOMEN.

As is well known since the time of Munro, puncture of the abdomen is made in the centre of a line passing from the umbilicus to the antero-superior iliac spine. TRZEBICKY, who in following this rule in one case was annoyed by serious hemorrhage from the epigastric artery, has studied on thirty-six different cadavers the relationship of this artery and the line of Munro. He concludes that in a great majority of cases puncture made in the middle of Munro's line will not strike the epigastric artery, but in a certain number of cases

the trocar may wound either the epigastric artery or one of its branches. Since the epigastric artery is found in the sheath of the abdominal rectus muscle, the point of selection for puncture must depend upon the situation of this muscle, especially when it is markedly stretched by the abdominal effusion. From an anatomical point of view, puncture in the linea alba is the least objectionable, but if the line of Munro is preferred, the puncture should be made on the level of the external half of this line.—*La Tribune Médicale*, October 22, 1891.

THE CONSTITUTION OF ANTISEPTINE.

Still another substance introduced by Radlauer as a definite chemical compound has turned out to be simply a mixture. This has already been shown to be the case as regards somnal and antinervine, and now DR. GOLDMANN shows, in *Les Nouveaux Remèdes* for October 8, 1891, that antiseptine, which is claimed to be a chemical combination, with a constitution of an iodo-boro-thymolate of zinc, is nothing but a mixture of the iodide of zinc (2½ parts), thymol (2½ parts), boracic acid (10 parts), and sulphate of zinc (85 parts).

THE ANTIRHEUMATIC PROPERTIES OF EPHEDRA VULGARIS.

Ephedra vulgaris enjoys considerable reputation among the Russian peasantry as a domestic remedy in rheumatic affections, and it has recently been experimented with by DR. BECHTINE in the clinical service of Professor Popow. His results seem to show that this remedy is possessed of considerable virtues in the treatment of both acute and chronic rheumatism.

The author employed this remedy in the form of a decoction of sixty grains of the powdered twigs and roots in about seven ounces of water, the dose being a tablespoonful every two hours. Dr. Bechtine states that the therapeutic effects of this drug are especially marked in cases of acute articular and muscular rheumatism, where its effects are manifested on the second day of treatment by considerable relief from pain and diminution of the fever, frequency of respiration, and pulse. He states that after a few days the articular swelling entirely disappears, and that after eight or ten days the patient may be considered cured. Even in cases where pericarditis existed as a complication this also is stated to have disappeared under treatment. In chronic rheumatic affections, the author states that the therapeutic action of ephedra is less favorable and more slowly produced; though here also he has obtained marked improvement, which, however, in the majority of cases, was only transient.

In addition to its antirheumatic properties, according to Dr. Bechtine, ephedra possesses a certain amount of laxative power, and is, besides, an active diuretic. As is well known, ephedrine, the alkaloid of *Ephedra vulgaris*, first isolated by Professor Nagai, of Tokio, is a marked mydriatic.

INTESTINAL ANTISEPSIS.

DR. DUJARDIN BEAUMETZ recommends in *Les Nouveaux Remèdes* for November 8, 1891, the following formula as a satisfactory intestinal antiseptic:

Salol,
Salicylate of bismuth,
Bicarbonate of sodium, āā 150 grains.

To be divided into thirty powders in capsules. One capsule to be taken before breakfast and before dinner.

TREATMENT OF INJURIES TO THE HEAD.

DR. SENGER, of Crefeld, has proposed a new method of treatment with the object of facilitating repair in suppurating wounds of the head, with exposure of the cranium. He first arrests the phlegmonous and puriform process by surgical and antiseptic treatment,—that is, by incisions, drainage, and dressing,—and so reduces the complicated injury to a simple cranial wound, which, of course, still produces a certain quantity of pus every twenty-four hours. A wet antiseptic dressing is then applied to the wound for two or three days, and when this is taken off the first layer of the tabula externa is removed with the help of a small chisel, in little scales, until drops of blood are seen in the bone. In from two to three days granulations protrude from the bone, and entirely cover it in from eight to ten days, and healing subsequently progresses as in other wounds. Suppuration ceases in proportion to the growth of the granulations. It is also possible to produce granulations by drilling several small holes in the external table until blood is seen; but the chisel is preferable, as it is difficult to estimate the depth of the drill-

hole, and the drilling takes more time than the chiselling. A still more serious objection to the former is that the holes get filled up with bone-dust. In neither method is it necessary to give an anæsthetic, as but little pain is felt during the trifling operation.—*Lancet*, November 7, 1891.

A NEW TREATMENT FOR COMPOUND FRACTURES.

According to the London correspondent of the *New York Medical Record* (November 14, 1891), MR. MANSELL MOULLIN read a paper before a recent meeting of the Clinical Society of London in which he advocated the treatment of compound fractures into joints by immersing the injured part in a bath of corrosive sublimate at the temperature of the body. If the accident were recent and the wound clean, the strength of the solution should be 1 in 10,000, with a few drops of hydrochloric acid added, and two hours' submersion night and morning would be sufficient. If, on the other hand, the injured part was foul, or some time had elapsed, and inflammation had already set in, the bath should be continuous, night and day, for forty-eight hours, and the strength of the solution should be 1 in 1000 for the first two. Over thirty primary cases of severe injury had been treated in this way with perfect success, except in two instances, in both of which the failure was traced distinctly to an escape of sewer-gas. Almost the same could be said of the secondary cases; but in one, in which a period of five days had been allowed to elapse, a secondary abscess formed (without a rigor or other sign of pyæmia) in the iliac fossa on the opposite side of the body.

THE "KEELEY CURE" AGAIN.

The *Medical Age* has the following on this "treatment":

"The so-called bichloride of gold treatment of inebriety, for which so much has been claimed, and to which the newspaper press has given such prominence, proves to be a rank humbug. Bichloride of gold, though a chemical possibility, is impossible therapeutically, as the preparation reduces and becomes inert the moment the chemical bichloride transformation is effected.

"It is stated that the remedies employed by the manager of the institution which has been chiefly identified with this treatment, at Dwight, Illinois, are the hypodermic use of cocaine and administration by mouth of the so-called bichloride of gold, which a recent analysis reveals to be a weak solution of aloin in water combined with comp. tr. cinchona. The only gold used in the treatment is that supplied by the dupes in the form of fees.

"The favorable effects of this treatment are in part due to the action of cocaine, but chiefly to the mental effect on the patients, who, emotionally stimulated by faith in the promised cure, are enabled to gain temporary control of their habit. The lay and religious press have given the chief quack and his humbug an amount of free advertising beyond computation.

"The secretary of the State Board of Health of Illinois is authority for the statement that the manager of this institution at Dwight was refused a license to practice medicine in Illinois."

CRESOL-IODIDE.

DR. PETERSEN has made experiments with this new medicament in Seiffert's clinic, and recommends it as a good application for diseases which are combined with increased secretion, such as rhinitis hyper-secretoria, eczema narium, etc.—*Journal of Laryngology*, October, 1891.

THE REFLEX ACTION OF THE TRIGEMINUS AS A THERAPEUTIC AGENT.

DR. KURT, in the *Deutsche Medicinal Zeitung* of May 7, suggests a method for controlling spasmodic conditions due to motor neuroses. Recognizing the fact that the application of certain irritants to the peripheral endings of the trigeminus, particularly at the conjunctiva and the nasal mucous membrane, retards reflex motor action, he takes advantage of this therapeutic principle to utilize such drugs or medicaments as antipyrin, quinine, and sugar. These he dusts with a camel's-hair pencil either in the eye or nasal mucous membrane, and asserts that he can thereby control the spasm of whooping-cough, laryngo-spasm, facial contractions, and some forms of epileptic attacks.—*Journal of Nervous and Mental Diseases*, October, 1891.

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